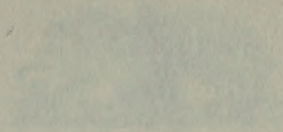


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DEPARTMENT OF AGRICULTURE

The Agricultural Gazette of Canada

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DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE

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The Agricultural Gazette of Canada

EDITOR: J. B. SPENCER, B.S.A.

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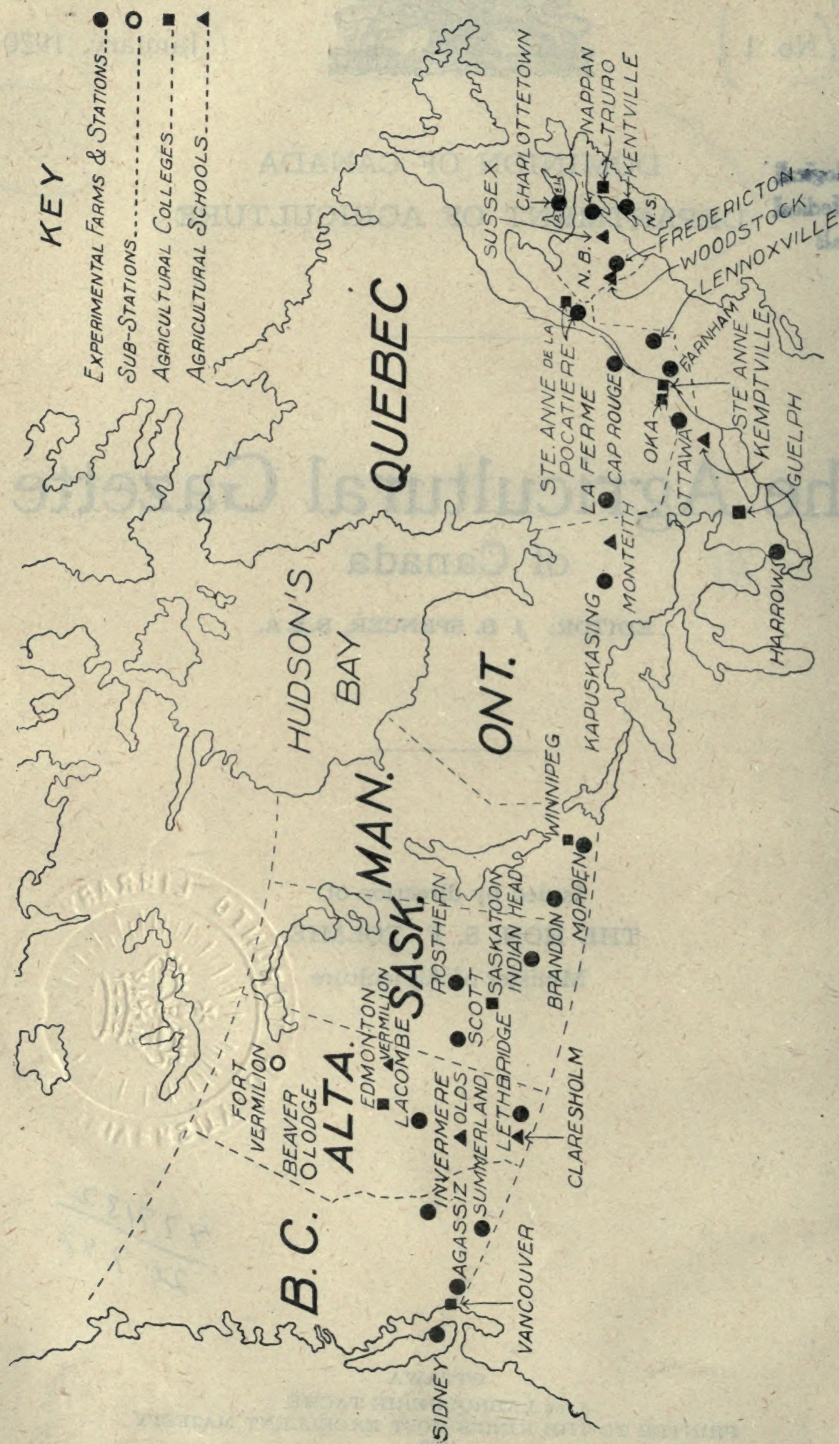


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1920



MAP OF CANADA SHOWING THE LOCATIONS OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

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OF CANADA

VOL. VII

JANUARY, 1920

No. 1

THE AGRICULTURAL GAZETTE of Canada is published monthly, in English and in French, by the Dominion Department of Agriculture. It is not intended for general circulation. A limited number of copies, however, are available to subscribers at \$1.00 per annum, or 10 cents per copy.

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LOOKING BACKWARD AND FORWARD.

"To know what others have accomplished; to know their methods of work; to learn the reasons for their successes and failures is to broaden our own sympathies and to stimulate our own enthusiasm."

Hon. MARTIN BURRELL.

WITH the present number *The Agricultural Gazette of Canada* commences its seventh volume. Upon its inception six years ago, its policy was fully considered and has been rigidly followed. It was not to be in any particular a publication in rivalry with, or in competition with, other agricultural publications; but it was to be an official record and current history of the work being done and the policies being followed and contemplated by all the Departments in the Dominion devoted to agriculture. In this manner it was hoped to co-ordinate the work as far as practicable and desirable and to encourage its standardization. A further idea was to advance the objects of *The Agricultural Instruction Act*: among other things of vital importance to encourage and foster a love of country life and its pursuits in the young; in other words to link school and college education with the general advancement of the rural community; to create a love from knowledge and intimacy for the cultivation of the soil and to bring opportunities for study and research work with its results, closer to the farm.

In carrying on the policy here briefly outlined, *The Gazette* cannot fail to prove a concise, yet complete history of the progress of agriculture in this great country. Now, more than ever, when the eyes of the entire world are centered upon the fruits of the farm it is desirable that complete official records should be tabulated and made known of the work that is being done, of the service that is being rendered. Officialdom can neither stand still nor afford to hide its light under a bushel.

Canada is the foremost of the family of the British Empire, and, being nearest, the great responsibility rests upon her, not alone to aid and succor in battle, but to lead the van in all forms of industrial life; to seize every opportunity to forward the grandeur and stability both of herself and of the Empire. The *Gazette* seeks to play its part by being a faithful chronicler of official acts, of official undertakings, methods and results.

By the course adopted in the different provinces being known to each other an exchange of ideas and trend is brought about with mutual benefit, the best in all being widely spread, digested and incubated. Such definite

results can be reached only by the earnest co-operation of officials, instructors and representatives throughout the country, and to them The Gazette especially appeals. If the response be generous and wholehearted, then the mission undertaken cannot but be successful. Not alone will all be brought into contact each be known to each, but the country will be benefitted and settlers be attracted.

While acknowledging liberal assistance by contributory information in the past, it is yet hoped that the same may be forthcoming to a greater extent and in a more general way in the future. United and sustained effort will alone enable Canada to take that foremost place in the rank of nations to which her resources, capabilities and capacity entitle her.

SOLDIER SETTLEMENT BOARD ACHIEVEMENT.

THE Director of Information of the Soldier Settlement Board has issued a statement showing the accomplishments of that Board up to the middle of December, 1919. During its operation the Board has provided loans aggregating \$51,572,332 to 17,218 returned soldiers who are settling on the land, the average loan being \$2,934. It has already granted 5,433 soldier entries approximating 869,000 acres of free lands in the western provinces. Roughly speaking two-thirds of the grantees also have exercised their civilian homestead rights which means an additional 575,000 acres—a grand total of 1,444,000 acres of free lands which have gone to returned soldiers. It has dealt with 42,630 returned soldiers who have applied for certificates qualifying them to become beneficiaries under the Act. Of these 32,363 candidates have received certificates.

The Board has established training centres for prospective settlers at

Kentville, N.S., Fredericton, N.B., Lennoxville, Que., and Matsqui, B.C., and is establishing centres at Elkhorn, Man. and Estey, Alta. Already 513 returned soldiers have been trained and there are 703 others now at training stations completing their courses in practical agriculture or with successful farmers gaining agricultural experience. Altogether \$44,699 has been paid in allowances for subsistence of the returned soldiers and their dependents during the period of training.

Through the special purchasing arrangements with implement makers and live stock dealers the Board has saved the soldier settlers \$224,853 in the cost of live stock, agricultural implements and other farm requirements. A branch has been established which helps the soldier's wife in any difficulty she may encounter. This is done by means of correspondence and by actual visits of home branch representatives.

PART I

Dominion Department of Agriculture

THE EXPERIMENTAL FARMS

POULTRY DIVISION

CHARLOTTETOWN EGG LAYING CONTEST.

BY J. A. CLARK, B.S.A., SUPERINTENDENT, EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

IT took years of patient, persistent work before the Charlottetown Egg Laying Contest became an accomplished fact. The final authorization came through just after the writer had sailed for overseas military service. The plans, however, had been completed and only the construction and publicity work needed to be done. Those in charge did this quickly and well.

Ten shed-roofed contest houses, 10 feet by 12 feet, were constructed to hold the twenty pens of the contest. Each pen was provided with a yard 12 feet by 50 feet. The houses were built on runners, so that they could be easily moved. They were made light and airy by having a window with four lights 12 inches by 18 inches and a large square of cotton in the front of each pen. Each house is divided into two pens by a 2-inch mesh wire partition. The pens are provided with a complete equipment, including supply hopper, dry mash hopper, grit shell, beef scrap and charcoal hopper, trapnests, dropping board, roosts, stand for water bucket, and an egg chart for the wall. The floors were made with double ply rough boards with tarpaper between. The outside walls were constructed of stained sheathing. The back wall and the ends as far front as the edge of the dropping-board were sheathed over building paper on the inside. The doors on either end and one in the centre

partition enabled the contest manager to do his work quickly. The houses were cleaned and disinfected regularly. Deep litter was always kept on the floors.

The breeds in the 1918-1919 contest were: one pen Anconas, three pens Rhode Island Reds, three pens White Wyandottes, five pens Barred Plymouth Rocks, and eight pens of White Leghorns. Ontario sent one entry, Quebec four, New Brunswick three, Nova Scotia five, and Prince Edward Island seven. The contest was open to all Canada and filled up quickly. The birds were all in their pens for some time before the contest started, so that they might be accustomed to their houses.

The board of management were: The Dominion Poultry Husbandmen, Superintendent, Charlottetown Station, Contest Manager, and the Poultry Representative of the Dominion Live Stock Branch. There were eight hens to each pen, and spares were allowed in case of birds dying. The contest lasted eleven months from November 1st, 1918, to September 30th, 1919. The awards made from time to time as the contest progressed, and the final awards have all been published in the press throughout the Dominion. Much valuable data was secured and forwarded to the owners of each pen. A number of summaries of general interest are here given:

The total eggs laid by 160 hens in

eleven months was 20,654, an average of 129 eggs each. Fifteen hens did not lay any eggs until after March 1st, 1919, and fifty-four did not lay more than 10 eggs until after that date. One hen only laid 25 eggs during the contest, four laid less than 50, fourteen less than 75, thirty-eight less than 100, and eighty or one-half of the hens in the contest laid less than 125. This shows that there is still room for great improvement among some of the best flocks in Eastern Canada. One of the finest looking pens only averaged 68 eggs per hen during the contest. On the other hand, the eighty hens that laid over 125 eggs more than made up for their unprofitable contest mates and brought the average per hen up as stated, to 129 eggs. Forty-five of these laid over 150 eggs and are eligible for the Record of Performance. Two hens laid over 225 eggs.

The heavy breeds led in the percent production during the autumn and winter. Towards the end of February the light breeds broke even and afterwards passed the heavy ones, holding a lead until the last of July. The heavy breeds then won out and maintained their lead until the finish. During the entire contest they laid an average of $2\frac{1}{4}$ eggs more per hen than the light breeds. This fact no doubt had much to do with the type of birds that form the population of the present contest.

With the exception of one pen, splendid gains were made in the weight of the individual hens during the contest, this amounted to a little over half a pound or 8.6 ounces each. Seven hens died, one pen losing two birds. The average value of the eggs laid per hen was \$4.52. The cost of feed for the average hen was \$2.77 and the net profit per hen \$1.65. One pen finished with a loss as it did not produce enough eggs to pay for its feed.

The average weight of the eggs was 24 ounces per dozen. One pen averaged 26 ounces throughout the contest and another $25\frac{1}{2}$ ounces. The pen

that laid the most eggs 1,340 was disqualified on account of small eggs; this pen only averaged $22\frac{1}{2}$ ounces per dozen. The hens that stood a chance of qualifying for the Record of Performance were held over through October 1919 and their records continued for the full year.

The First Egg Laying Contest was then shipped out to make way for the Second P. E. Island Egg Laying Contest that started November 1st, 1919, with 21 pens of ten birds each. The new contest will continue for fifty two weeks. Quebec has sent two entries, Nova Scotia four and P. E. Island fifteen. The breeds entered are: One Speckled Sussex, one Rhode Island Red, one Silver Wyandotte, three White Wyandottes, six White Leghorns and nine Barred Plymouth Rocks.

The birds for the new contest arrived during the last two days of October and the contest started November 1st. The birds on the whole are not as well matured as last year, when we had four pens of old hens, but being vigorous pullets they should give a better account of themselves at the finish. The contest houses will be located in a sheltered place in the orchard at the Experimental Station for the winter. The hens are to remain inside throughout the contest.

The system of feeding will be as follows: Mixed grain fed in the litter morning and afternoon with dry mash, shell, grit, beef scrap, charcoal and fresh water before them all the time. They are supplied every forenoon with all the mangles or other green feed they will eat. The grain mixture is made up of one part cracked corn, one part wheat, one part oats and one part of buckwheat or barley. The dry mash is weighed up and mixed as follows: 400 pounds finely ground wheat screenings, 100 pounds bran, 100 pounds shorts, 100 pounds cornmeal, 50 pounds blood meal and 50 pounds of oil cake or gluten meal. In the spring the

quantity of cracked corn will be reduced.

The contest shall be decided by the total number of marketable eggs laid by each pen. Any bird that lays 150 eggs or more during the contest will

be eligible for registration in the Record of Performance and the birds laying 225 eggs or over will be eligible for registration in the Advanced Record of Performance.

CANADIAN EGG LAYING CONTEST.

BY F. C. ELFORD, DOMINION POULTRY HUSBANDMAN.

THE following valuable list of prizes have been arranged as awards in the Canadian Egg Laying Contest now being conducted at the Experimental Farm, Ottawa. All prizes with exception of the last two are from the accumulation of entrants' fees.

To the Pen laying—

The greatest number of marketable eggs in year.....	\$ 70 00
The second greatest number of marketable eggs in year.....	60 00
The third greatest number of marketable eggs in year.....	50 00
The fourth greatest number of marketable eggs in year.....	40 00
The fifth greatest number of marketable eggs in year.....	35 00
The sixth greatest number marketable eggs in year.....	30 00
The seventh greatest number of marketable eggs in year.....	25 00
The eighth greatest number of marketable eggs in year.....	20 00

The ninth greatest number of marketable eggs in year.....	15 00
The tenth greatest number of marketable eggs in year.....	10 00
The greatest number of marketable eggs each month.....	10 00
To the Bird laying the greatest number of marketable eggs each month	10 00
To the Pen showing best revenue over cost of feed for year.....	25 00
To the Pen with largest number of birds in "Advanced Record of Performance" (225).....	25 00
To the Pen with largest number of birds in "Record of Performance" (150).....	25 00
TO the Bird with best yearly record	25 00
To the Pen having the largest number of eggs on last day of Feb....	5 00
To the Bird having the largest number of eggs on last day of Feb....	5 00

The last two prizes are donated by Mr. H. L. Warren, St. Lambert, Que., and as others have intimated that they would like to contribute to this the list will probably grow.

DIVISION OF BOTANY

APPOINTMENT OF OFFICER-IN-CHARGE AT ST. CATHARINES FIELD LABORATORY

THE position in the Division of Botany, Experimental Farms, of Officer-in-Charge, Field Laboratory of Plant Pathology, St. Catharines, Ont., which was rendered vacant by the resignation of Mr. W. A. McCubbin, M.A., has been filled by the appointment of Dr. W. H. Rankin, Assistant Professor of Plant Pathology at Cornell University, Ithaca, N.Y., since 1914.

The Laboratory at St. Catharines has been established since 1913, and the investigational work, chiefly on fruit diseases, carried on there has been very successful and of considerable value to the fruit growers of the Niagara Peninsula. By the appointment of an Officer-in-Charge of the training and experience possessed by Dr. Rankin, a continuance of successful and valuable work along this line is assured.

ENTOMOLOGICAL BRANCH

THE USE OF WHITE ARSENIC AS AN INSECTICIDE IN BORDEAUX MIXTURE.

BY G. E. SANDERS AND A. KELSALL, INSECTICIDE INVESTIGATIONS.

ARSENIUS oxide, or the ordinary white arsenic of commerce, is the base from which all arsenical insecticides such as Paris green, arsenate of lead, etc., are made. It is by far the cheapest, and

also the most concentrated form in which to buy the element arsenic. A comparison of present prices in Nova Scotia may be obtained from the following table which is approximately correct.

	White Arsenic.	Arsenate of Lime.	Arsenate of Soda.	Paris Green.	Arsenate of Lead (Dry).	Arsenate of Lead (Paste).
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Price per pound.....	0 12	0 22	0 35	0 55	0 30	0 16
Per cent metallic arsenic.....	74%	27%	40%	39%	20%	10%
Price per pound of metallic arsenic.....	0 16	0 82	0 86	1 41	1 50	1 60

It will be seen that on the basis of the arsenic content, the arsenic in arsenate of lime, which is the second lowest in price, costs five times as much as that in white arsenic, also that the most expensive arsenical on the list, paste arsenate of lead, costs, per unit of arsenic, ten times as much. Roughly (though not strictly), the killing value of arsenicals varies directly with the arsenic content. It therefore follows that if a method can be discovered of using white arsenic as a substitute for the ordinary arsenicals, it would save the farmer or gardener who uses poisoned Bordeaux, the manufacturing cost of converting white arsenic into the commercial arsenical insecticides.

Since the time that insecticides were first used many experimenters have attempted to use white arsenic on foliage, with variable results which for the most part were far from encouraging. On the other hand, considering that upwards of one million dollars worth of Paris green is sold annually in Canada, it can be readily understood that a method of using white arsenic in potato work, might constitute a saving of some hundred thousand dollars per year to Canada alone. It was with this idea

in view that the writers, acting under instructions from the Dominion Entomologist, Dr. C. Gordon Hewitt, have been experimenting for three years on various methods of using white arsenic. Besides entailing much laboratory work there have been upwards of three hundred experimental field plots devoted to this subject, and as a result the method of preparation outlined below has been devised. This method is safe and simple enough to place in the hands of growers and it has been used very successfully on a large scale by various farmers, on the Dominion Experimental Stations at Fredericton, N.S., and Kentville, N.S., and at the Entomological Branch laboratories at Ottawa, Annapolis, N.S., Strathroy, Ont., and Hemmingford, Ont.

The advantages of white arsenic over other arsenicals may be stated:—

1. Its low cost, varying from one-fifth to one tenth per unit of arsenic, over that of other arsenicals.
2. Its concentrated form, which is an advantage in transportation and storage.

The disadvantages which have prevented the use of white arsenic may be stated:—

1. The difficulty with which it mixes with water.
2. Its poor physical condition.
3. Its low killing value (reported by some investigators).
4. Its caustic action on foliage.

The list of disadvantages, while quite formidable, can nevertheless be overcome. They will be taken up in the order in which they have been enumerated.

The difficulty of mixing with water is partly overcome by using a superfine white arsenic, that is, one which will pass a screen of two hundred and fifty meshes to the inch. Such a white arsenic is readily obtainable. It was also found that when a mechanical mixture of white arsenic and some other powder readily miscible with water was made, then the whole mixture would readily go into suspension. For this particular purpose hydrated lime was found to be most suitable. The remedy then is to mix dry white arsenic thoroughly with an equal weight of hydrated lime.

The poor physical condition of ordinary white arsenic is also remedied by the use of the superfine material. Furthermore, the chemical actions involved in making the Bordeaux mixture as outlined below, produce an adhesive, gelatinous precipitate, not excelled by any other insecticide.

The low killing value of ordinary white arsenic is largely dependent upon its physical condition, and when that is remedied, the toxic value of the mixture here described, is equal, per unit of arsenic, to the best form of any other arsenite.

It was found early in the experiments, as other experimenters had discovered, that while white arsenic was caustic to foliage, a mixture of white arsenic and lime was even more so. On the other hand we found that the copper of Bordeaux mixture had a great influence in reducing to the point of safety the caustic action of white arsenic. This was borne out to such an extent that if a Bordeaux mixture were made containing (as is the general practice) ten pounds or

more of copper sulphate per hundred gallons, to which was added not more than one pound of white arsenic, which is about the requisite amount for practical purposes, the resulting mixture when applied to potato foliage continuously through a season, would produce no apparent foliage injury in three cases out of four, and at most the foliage injury would be very slight. After a great deal of experimenting it was determined that if Bordeaux mixture containing white arsenic were made in such a way that the major portion of the white arsenic went into combination with the copper, and that the ratios of copper and arsenic present were within certain limits, then a Bordeaux-white arsenic mixture could be produced which would be safe on foliage. This could be readily done in the laboratory, and the main efforts were then directed towards achieving the same result by methods which would fit in with farm practice, and at the same time not destroy the physical properties of Bordeaux mixture.

The following is the method to be employed in making such a mixture. The directions must be strictly adhered to. The arsenic must be superfine, that is, guaranteed to pass a screen of two hundred and fifty meshes to the inch. It is immaterial whether high calcium or dolomite lime is used though we prefer high calcium lime:

In order to make ten gallons of copper sulphate stock solution, fill the vessel with ten gallons of water and sift into this a mixture of one pound of white arsenic and one pound of hydrated lime. Thoroughly agitate the mixture and suspend in this solution a sack containing ten pounds of crystal copper sulphate. It is preferable to stir occasionally while the copper sulphate is dissolving. This solution should be made at least twenty-four hours before it is used, and when made it will keep indefinitely. It should be stirred thoroughly before it is diluted. The

stock solution is used in precisely the same way as the stock solution of copper sulphate prepared by the customary method. The stock solution of lime is made in the usual way, or hydrated lime may be used.

The poisoned Bordeaux mixture made in this way will be green in colour and will have the desirable physical characteristics of an ordinary Bordeaux mixture. It was thought by the writers that the fungicidal value of this modified Bordeaux Mixture might be decreased, but experiments to determine this point have indicated equal fungicidal value.

The low cost is of course the great advantage in using this formula. It is possible by using it to spray an acre of potatoes with both fungicide and insecticide at approximately the same cost as that required to spray with an insecticide, such as Paris Green or arsenate of lead, alone. This formula necessitating Bordeaux should cause more people to use a fungicide in spraying potatoes, in addition to saving from eighty to ninety per cent of the insecticide cost.

THE EUROPEAN APPLE SUCKER QUARANTINE

BY C. GORDON HEWITT, D.S.C., DOMINION ENTOMOLOGIST

IN the September number of THE AGRICULTURAL GAZETTE, pages 823-827 the discovery of the European Apple Sucker, *Psyllia mali*, European Apple Sucker, *Psyllia mali* near Wolfville, N.S. during the past summer was described and the serious character of this European fruit pest was emphasized. The danger of the spread of this pest from the locality now infested was immediately recognized and with a view to the institution of quarantine measures the matter was fully investigated by the Branch. As a result of this investigation the infested area was quarantined by the addition of subsection (c) to Section 12 of the Regulations under the Destructive Insect and Pest Act which was made by Order in Council on November 28:

"No apple stock of any description including nursery stocks, seedlings, scions, buds and grafts shall be removed from that area, included within a radius of five miles of the Post Office of the town of Wolfville in the county of Kings, Province of Nova Scotia, unless the same is accompanied by a certificate of inspection signed by an authorized inspector, which states that the said

stock, seedlings, scions, buds or grafts, has been duly treated in accordance with the instructions of the Department of Agriculture and is free from the apple sucker, *Psyllia mali* Schmidberger.

The Apple Sucker, *Psyllia mali* was also added to the list of destructive insect pests and diseases named in Section 18 of the Regulations.

This quarantine prohibits the movement from the infested area of all forms of apple stock that are likely to disseminate this insect to other districts. The Apple Sucker spends the winter in the egg stage, they are very small and are laid on the twigs of apple. The above regulation has been passed in order to prevent its further spread on infested scions, nursery stock, etc. It is hoped that this measure will prevent the spread of the pest by artificial means. At the same time, however, every effort will be made to exterminate this pest in the orchards in which it has been found to occur and the pest is being fully investigated by the Provincial Entomologist, Professor W. H. Brittain.

DAIRY AND COLD STORAGE BRANCH

THE GRIMSBY PRE-COOLING AND EXPERIMENTAL FRUIT STORAGE WAREHOUSE REPORT, 1919.

BY C. M. BONHAM, SUPERINTENDENT.

THE fruit season of 1919 has been a somewhat peculiar one throughout the Niagara district. A most unusual feature was the very nearly complete failure of the plum crop. The shipment of this fruit constitutes, in a normal season, a very important part of the work at the Grimsby Cold Storage but, notwithstanding this shortage of plums, the demand for space has been greater and more fruit has been handled than in any previous season.

Operations were begun this year at least two weeks earlier than usual. This was due partly to the early season and partly to the fact that a large quantity of strawberries was stored this year. This is the first season in which strawberries have been handled commercially to any extent. In 1915 a shipment of a few hundred crates was made to Winnipeg. Those stored during the season just past were principally for canning purposes, and considering the very unfavourable conditions under which they were handled before reaching the storage, they were turned out with very satisfactory results. Many of these berries were trucked from ten to twenty miles over rough roads and through extreme heat while others were shipped to the storage in box cars. In spite of these adverse conditions it was found possible to hold them for a week to ten days with slight wastage, and with berries brought in immediately after picking considerably better results were obtained. In order to reduce the waste to a minimum on this class of storage two conditions are very necessary. First, a sufficient volume of refrigeration to cool the fruit in the quickest possible time and second, forced ventilation in the rooms while the berries are in storage. Without this continual circulation of air it is

impossible to keep the berries from developing mould under anything less than freezing temperatures. Given these two necessary conditions of storage no difficulty ought to be experienced in storing strawberries either for local use or for short distance shipment. The degree of success will always vary according to the manner in which the berries are handled and this stage of ripeness of the fruit previous to storing.

Notwithstanding the fact that cherries were only a fair crop in the Grimsby district and that local prices were very high more of this fruit was handled in 1919 than in any previous season. Ten pre-cooled cars were shipped and a large quantity stored for the local canning factories, etc. Of the pre-cooled shipment four cars went to Winnipeg, one was shipped to an Ontario market and five were exported to New York State. Prices ruled very high, especially on the cars exported and the demand for cherries was at all times greater than the supply.

Raspberries, goose-berries, black currants, etc., were not handled to any great extent this year. About one car of each was all that was stored.

The fall rush began before the middle of August this year, and the bulk of the pears and tomatoes as well as most of the plums were handled between then and the end of the first week in September.

Plums, which in a normal year constitute from 30 to 40 per cent of the total amount of fruit handled for the season, were this year nearly a complete failure in the Niagara peninsula and the quantity stored was only about 10 per cent of what is received from a normal crop. Because of the fact that plums could not be obtained in car lots, no pre-cooled shipments

were made. Those handled were for shipment by express to local markets and for the canning factories.

The quantity of tomatoes stored in 1919 was not large, the total amounting to about one car. This fruit was almost entirely shipped by express to Ontario points.

Pears comprised by far the heaviest part of the season's work, the quantity stored being over 60 per cent of the total for the fall season and nearly 40 per cent of the total for the whole season. This demand for pear storage is partly explained by the fact that Bartlett's were a good crop in this district and many were stored for the usual purpose of extending the marketing season. On account of the early season and hot weather the market for Bartlett's was not at its best early in September. The quantity of pears stored was limited only by our storage capacity and was approximately thirty cars.

Peach storage during the season just finished showed an increase of about 150 per cent over that of 1918. With the exception of a relatively small quantity stored for express shipment, all peaches stored this year were for the local canning companies. It was, unfortunately, impossible to take all the peaches offered for storage because the same growers and shippers who wished to store them had already filled our entire available space with Bartlett pears, etc., and could not move them to advantage early enough to enable them to store the peaches. It was very noticeable that peaches delivered to the plant as soon as picked gave much better results than those that were held in packing houses, even for a short time, and that those stored loose in orchard boxes, held up better than those packed in climax baskets. Following is a summary of the amounts of the different kinds of fruit handled during the season of 1919.

*Statement of Fruit Handled
to November 1, 1919.*

<i>Fruit</i>	<i>Pounds</i>
Strawberries.....	130,000
Cherries.....	307,000
Raspberries.....	21,150
Gooseberries.....	10,000
Red currants.....	4,550
Black currants.....	2,000
Pears.....	539,631
Peaches.....	206,616
Plums.....	53,023
Tomatoes.....	20,978
Grapes.....	46,413
Apples.....	2,754
Total.....	1,344,115

Distribution of Pre-cooled Cars.

New York State.....	5
Winnipeg.....	4
Ontario.....	3
Quebec.....	1
Total.....	13

Although the quantity of fruit handled this year was the largest since the storage was opened, the pre-cooled car lot shipments were very few, there being only thirteen cars, ten of which were cherries. This decline in pre-cooling for long distance shipment may be attributed principally to three causes. First, the almost total failure of the plum crop, second, the fact that the markets of Ontario and Quebec were able to take all the available fruit at very attractive prices, and third, the fact that the canning companies bought heavily of almost all kinds of fruit at good prices.

The first mentioned reason had probably the greatest influence on our pre-cooled shipments since plums constitute approximately 60 per cent of the shipments made from the Grimsby plant to the western provinces. Owing to the fact that they could not be obtained in sufficient quantities no pre-cooled shipments of plums were made during the past season.

The fact that the nearer markets of Ontario and Quebec furnished a heavy enough demand to take all fruit available for shipment at good prices also affected the shipment of pre-cooled cars to distant points. Prices were such that long distance shipments could not be made to show any advantage over sales of a more local nature and in many instances Ontario fruit could not meet the competition of Washington and British Columbia fruit on the prairie markets this year, especially in those varieties of which the crop was heavy in Western Canada and the Pacific States. This applied very particularly in the case of pears, which in most seasons are pre-cooled quite extensively for shipment to prairie points. In spite of the fact that prices for Bartlett pears were favourable in Ontario it was found that the Washington product of excellent quality could be laid down in the Niagara district to compete with home grown pears. A large number of cars came into the district, about thirty coming to the factories in Grimsby alone. It is evident that

in a season when conditions of this nature exist, Ontario pears could not compete on the prairie markets with those grown in the nearer producing areas of British Columbia and Washington.

We have had again this season an increasing demand for storage space for almost all kinds of fruit and it was only possible, owing to our limited capacity, to take about half the fruit offered even though only about two cars of plums were handled as against twenty-five to thirty in a normal year. The experience of the past season again emphasizes very strongly the need of greater storage space if we are to meet the demand in seasons when with crop and market conditions favourable, we may expect a large number of pre-cooled shipments as well as a still greater demand for storage space to be used for the purpose of extending the marketing season, keeping fruit off the market during a serious glut, or storing fruit which the grower may not be able to sell except at a loss if forced to place it on the market at the time of picking.

SENIOR SUPERVISOR OF COW TESTING APPOINTED.

BY J. A. RUDDICK, DAIRY AND COLD STORAGE COMMISSIONER.

MR. A. H. White, B.S.A., has been appointed to the position of Senior Supervisor of Cow Testing in the Dairy and Cold Storage Branch. This is a new position which has been created with a view of promoting the cow testing work with greater efficiency throughout the whole Dominion. Mr. White who has just returned from overseas,

comes to the Department with a good record and with training and abilities which fit him for this important position. He will have charge of the compilation of the records, carry on the propaganda in connection with cow testing and generally supervise the work throughout the Dominion.

HEALTH OF ANIMALS BRANCH

INSPECTION OF STOCK YARDS.

BY F. TORRANCE, B.A., D.V.SC., VETERINARY DIRECTOR GENERAL.

THE regulations under the Animal Contagious Diseases Act provide in Section 84 for the inspection of yards and their main-

tenance in a sanitary condition. The section is as follows:—

"All yards, stables, sheds or other premises used by railway or steamship companies or

other persons, for the accommodation of animals shall be maintained in a clean, comfortable and sanitary condition and shall be subject at all times to inspection by inspectors acting under the authority of the Minister, who, when they deem such action necessary, may order the cleansing and disinfection in a satisfactory manner of the said yards, stables, sheds or other premises as provided in the Animal Contagious Diseases Act."

In order to carry out the provisions of this regulation the branch has a number of so-called car and yard inspectors acting under a chief inspector for Eastern Canada and another for Western Canada. These inspectors are charged with the duty of maintaining all stock yards and cars in a clean, sanitary condition. The chief inspectors maintain a constant supervision over the local inspectors, travelling from point to point as occasion requires, and make periodical visits along the railways to points where no regular employee is stationed.

The railways have shown a great willingness to co-operate with the branch in maintaining proper sanitary conditions in stock yards, and except under stress of extraordinarily large shipments, which at times have overtaxed the capacity of our largest yards, a fairly satisfactory condition is maintained.

We require the yards to be white-washed at least twice a year and whenever a yard is found from any cause to be in an unsanitary condition the inspectors have authority to close it until such time as the necessary cleansing and disinfection is completed.

The system of dealing with stock cars is slightly different but carried out along similar lines. Section 86 of the Regulations provides for the cleansing and disinfection of these cars and certain points are designated in Canada where these cars must be disinfected. At each of these points the branch has stationed an inspector, whose duty it is to see that the provisions of the law are observed. He watches the men at work cleaning out the refuse and manure from the cars and then applying the disinfectant. This is usually spread on with a force pump operated either by hand-power or steam, and when the car is cleansed and disinfected it is certified by a card bearing the signature of our inspector and tacked on the door. This system of car cleaning is a very essential part of the control of contagious diseases as infection never finds a better condition for its spread than in the close confinement of animals in stock yards and stock cars.

QUARANTINE REGULATION AMENDMENT.

BY FREDERICK TORRANCE, B.A., D.V.S., VETERINARY DIRECTOR GENERAL.

THE quarantine regulations under the Animal Contagious Diseases Act have been amended by adding the following sub sections:—

19 (b) "Every transportation company bringing animals to Canada by vessel, or by rail, or otherwise, and every officer and servant of every such transportation company having charge of or control of such animals shall be guilty of an offence against these regulations if any of the said animals be landed in Canada without a permit for importation when a permit is required by these regulations"

The reason for passing this amendment was due to the necessity of placing the responsibility definitely upon transportation companies who persist in accepting shipments of stock from overseas which were not accompanied by the necessary permit.

The conditions following the European war have increased very materially the danger of importing contagious diseases.

It is a very serious matter for the importer to have a shipment of animals brought over from England refused entry upon arriving at the Atlantic seaboard, and the Department was always more or less in doubt as to whether the importer or the transportation company would be held responsible. The amendment referred to settles this question, and in future any transportation company that brings animals over to this side of the Atlantic without a permit will not only be prosecuted, but will be held responsible for any financial losses resulting through their action.

ACCREDITED HERD APPLICATIONS FORM.

IN order to give breeders of pure bred cattle in Canada an opportunity to take advantage of the regulations for the establishment and maintenance of tuberculosis free accredited herds, copies of the required form have been sent out to the owners of pure bred herds. The form reads as follows:

THE APPLICATION FORM.

TO THE VETERINARY DIRECTOR-GENERAL
OTTAWA, ONTARIO.

SIR—

I hereby make application to have my herd of cattle located at..... tested for Tuberculosis with a view to having the herd placed upon the ACCREDITED LIST whenever the necessary conditions are fulfilled.

In consideration of the assistance of the Health of Animals Branch I hereby agree to the following conditions:—

(1) I will permit my entire herd or any cattle of my herd to be examined and to be tuberculin tested or re-tested at such times as are considered necessary by the Veterinary Director-General.

(2) I agree that no cattle shall be presented to the tuberculin test which have been injected with tuberculin within sixty days immediately preceding or which have at any time reacted to a tuberculin test.

(3) If any of my cattle are condemned as a result of reaction to the tuberculin test or from physical evidences of Tuberculosis I agree to immediately remove them from my herd and dispose of them either by immediate

slaughter or by some other method approved by the Veterinary Inspector in charge of the test.

(4) I agree that all milk and other dairy products fed to calves in my herd shall be produced by an accredited herd or if from outside or unknown sources shall be pasteurized by heating to not less than 150 F. for not less than twenty minutes.

(5) I will allow no cattle to associate with my herd which have not passed a tuberculin test approved by the Veterinary Director-General. I will keep all new cattle separated from my herd pending the application of a tuberculin test by an inspector of the Health of Animals Branch. I will notify the Veterinary Director-General immediately of any additions to my herd by purchase and will permit inspection of the records of my herd by the proper officials at any time.

(6) I will maintain my herd and premises in a sanitary condition at all times and will disinfect my premises according to the directions of the Veterinary Inspector whenever it becomes necessary.

(7) I will furnish transportation between the railway stations and my farm for the Veterinary Inspector whenever it is required.

Number.

Bulls.....
Cows.....
Heifers.....
Calves under six months..

Dated at.....this.....

day of.....19..

(Signed).....

Witness.....

France, Belgium and Germany are now in the market for fat cattle, and Great Britain can obtain only one-tenth of the Canadian goods—bacon, eggs, etc.—that she requires. For the ten months ending October, 996,599 head of cattle, hogs and sheep were marketed at the Union Stock Yards, Toronto, as compared with 776,874 for the same period last year. At other cattle centres there has been a corresponding increase. It is evidence of a real demand for cattle products that the seasonable decline in price, especially in view of such large receipts, has been so slight. A considerable proportion of the cattle offered, however, are unfinished, and cows and heifers are being marketed and exported at an undesirable rate, partly on account of the fear of governmental interference with prices.

From November Monthly Commercial Letter issued by The Canadian Bank of Commerce.

THE LIVE STOCK BRANCH

THE LIVE STOCK BRANCH AND THE OPERATION OF STOCK YARDS

BY P. E. LIGHT, MARKETS INTELLIGENCE DIVISION

REGULATIONS passed by Order in Council and prescribed under the Live Stock and Live Stock Products Act, 1917, make provision for Federal control of stock yards. These regulations, which are being administered by the Department of Agriculture through the Live Stock Branch, became effective during the latter part of August of the present year. Since that date the construction, equipment, maintenance, and operation of stock yards are subject to the approval of the Minister of Agriculture.

A feature of the regulations is that provision is made for the use of weigh scales equipped with a type-register beam and operated by weigh-masters approved by the Minister. Provision is also made for the prompt unloading of live stock on its arrival at the yards and the handling of the same in such a manner as to prevent bruising and injury, such conditions having been very prevalent and the cause of considerable annual loss to the live stock trade. The regulations also provide for adequate supplies of feed at fair prices, and proper care and

feeding of stock from the time of unloading until a signed release is given by the owner or agent. Under the Order in Council the proprietor accepts full responsibility for the operation and equipment of the stock yards in accordance with the regulations and will be held responsible under the Act to the Minister of Agriculture.

The observance of the regulations will result in uniform methods in the purchase and sale of live stock at stock yards, and the use of buildings and equipment most suitable for the accommodation and care of stock received.

Under the direction of Mr. D. M. Johnson, Supervisor of Markets for the Branch, responsible to the Live Stock Commissioner, the chief markets officer at each of the central stock yards is empowered to see to the carrying out of the provisions of the regulations.

The reasonable attitude being taken by the yard companies toward the regulations is resulting in satisfactory progress toward efficient service.

We cannot expect men to remain on farms unless the farms are profitable—nor can we expect men and women to remain in the country unless their children can obtain the educational facilities that are available to the children of the cities. The very root of the problem lies in this matter of rural education and in the development of a country life that offers not only profit, but education, health and a fair measure of enjoyment. Farm sanitation, good roads, beautification of farms, the use of rural schools as community centres, all these and many other issues are involved.

Joseph Hirsch in *The Banker-Farmer*.

PART II

Provincial Government Departments

THE AGRICULTURAL COLLEGE IN THE NEW ERA

AGRICULTURAL COLLEGES MUST ASSUME NEW RESPONSIBILITIES

BY DR. M. CUMMING, B.A., B.S.A., PRINCIPAL, NOVA SCOTIA AGRICULTURAL COLLEGE

WHEREAS other professions have been in the forefront of the world's councils for centuries, it has remained for the twentieth century to witness at least the beginning of a movement in which farmers will take their place among the leaders in the seats of the mighty. Paralleling this is the fact that agricultural education, as such, has been established for little more than the last half century of the world's history while other professions have, up to the present time, been far in the ascendancy in the councils of state, largely because they were the prior champions of the cause of education, and they earlier benefitted by it.

The diffusement of education among farmers has borne fruit in increased production, closer co-operation, in general improvement and now, in farmers assuming the responsibilities of government. The uninformed must not, however, assume from this that all educated farmers and all farmer members of the legislature and of the government are graduates of agricultural colleges or universities. Such is no more true of farmers than of other classes of people. But it is the case that a large number of the outstanding leaders are graduates of colleges and universities and that all of the others have been benefitted and uplifted by the diffusement of education

for which the colleges have been ultimately responsible. Just as education has given power to industry, science, and art so it has now achieved power for the men who have heretofore constituted only the foundation



DR. M. CUMMING, B.A., B.S.A.

and who have not participated in the building of the edifice of the world's civilization.

This new achievement does put a new responsibility upon the agricultural colleges of the country.

These have heretofore been teachers mainly of the science of production and although always giving a place to literature and economics, and like subjects of a more liberal education these have never been the prominent features of their curricula. Nevertheless, it is noteworthy that the subject of economics in particular has of recent years been attracting more and more attention in these institutions—not just the dry principles of political economy but the applied principles of taxation, of returns from industry, and of the actual relation of agriculture to the other industries and professions, a subject which, along with literature and allied subjects, should in this new era receive increased attention at all agricultural colleges.

It is no easy problem with which farmer politicians have now to wrestle. Their claim is that agriculture has not received the consideration it should have received in the councils of state and there are few students of the world's progress who will not agree with them. On the other hand, class legislation that might temporarily contribute to the farmers' benefit, but that ultimately might overthrow the successful pursuit of other industry, would be a

fatal policy both for the welfare of the nation as a whole and of the farming population itself.

The need then of the time is for a broader education for everyone in general and at this special time for the farmer in particular, an education that will broaden his outlook and improve his status, and increase his power. If this new farmer movement achieves this and nothing more, it will ultimately redound to the improvement of the farmer's position in the state, but the facts are that as the new farmer movement diffuses education among the rank and file of the farmers of the country, the movement itself will gain power and momentum.

The new farmer leaders will do well, therefore, to see to it that agricultural colleges are advanced, and that agricultural education receives more attention in the schools. On the other hand, the staffs of the colleges must exert themselves to their utmost to keep ahead of this great agrarian movement and so retain their positions as leaders in that education which will give the power that rightly belongs to those whose activities constitute the foundation of the country's development.

THE AGRICULTURAL COLLEGE A LUMINOUS BEACON

BY REV. PERE JEAN DE LA CROIX, DIRECTOR, OKA INSTITUTE OF AGRICULTURE

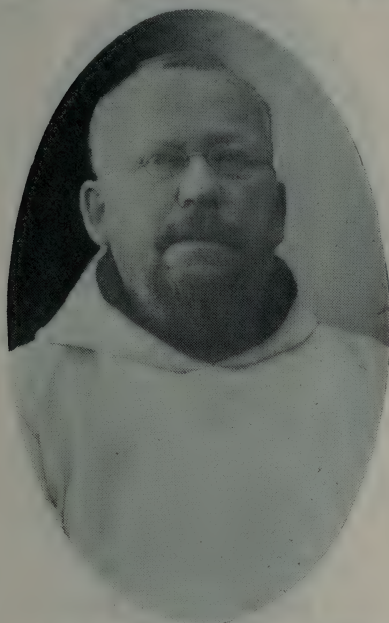
THIS term "new era", under which the period following the war is known, takes on a special significance when applied to agriculture—a significance as deep as that of the old and immutable adage; "The earth is the foster-mother of mankind" from which is derived this other equally firm principle "Agriculture is the basis of national prosperity".

Truly a new era is dawning for the province of Quebec. Her best sons, no longer fascinated by those liberal professions which had been their only goal in the past, are now coming back to the land. From 1916 to

1919, no less than fifty-five young men of high intellect, who, after seven or eight years of college studies, could have aspired to good positions, have come to the Oka Institute of Agriculture, to spend four more years in preparing themselves to promote the interests of the agricultural community, and therefore, of the country. And after the war this movement seems to have taken a new strength.

There has perhaps been no finer development than this one in the evolution of Canadian agriculture and one may naturally wonder what has been the cause of it.

The causes are several: the decrease of prosperity resulting from the exodus of the rural population to the city; a better appreciation of the dignity of farm work; the fact that the agricultural class is now better protected by the governments. But these are only secondary causes I



REV. FATHER JEAN DE LA CROIX.

believe; the real cause is a reawakening of the love of the soil—a love innate to our race, it is the loud voice of the ancestors, beseeching their sons not to abandon the wealth of the land they had cleared and by which their race was to be maintained and ennobled. Atavism, generally

a cause of disappointment, here becomes the strength of the future. Our educated young men have come to realize that the nobility of the land always was the hereditary nobility of the province of Quebec, and that their real vocation is to follow the furrow opened by their fathers.

And what has been the great factor of this new mentality unhoped for twenty years ago? This is obviously the agricultural college, which like a luminous beacon, projects its rays on new fields. It is really the agricultural college shaping on agricultural mentality, making of agriculture a science as pleasant as it is useful. If one goes back to the foundation of the Oka Institute of Agriculture (1894) it is not difficult to point out the good it has done by its influence on the improvement of the lands and dairy herds of neighbouring districts, the establishment of beautiful orchards, the development of poultry husbandry, following an intelligent and active propaganda conducted by its many regular students and the students of the short courses; farmers, school inspectors or teachers, who, later on, have spread far and wide in our province, the agricultural teachings which they had received in this Institution.

The province of Quebec has a right to be proud of its schools of agriculture; by teaching her sons they keep them in the traditional path which has always been her real glory.

THE AGRICULTURAL COLLEGE MUST LEAD IN THE AGRICULTURAL ERA.

BY DR. F. C. HARRISON, B.S.A., D.SC., PRINCIPAL MACDONALD COLLEGE

IT is a significant fact that the prime minister elect of the province of Ontario is an agricultural college graduate and two of his colleagues in the cabinet share this distinction with him.

This seems to point out the value

of a graduate course in agriculture and the contention that in such a course it is not only necessary to teach the practical subjects but also those subjects which are educational and fitting for public life although these are often looked upon by many

practical men as not necessary in an agricultural course. The mere fact that the farmer is taking a greater interest in his own activities, and in political life, should point out to our colleges the necessity of preparing their students for the larger duties which they must assume in the future.

The agricultural college must be the leader in the agricultural era on which we seem to be entering, and how best to train men for leadership will be a problem that each institution will have to work out for itself.

Up to the present, most of our colleges have graduated specialists in agriculture, (live stock and agronomy) horticulture, dairying, biology, chemistry, etc. but no graduates have had more than a smattering of economics and rural sociology, and it seems necessary not only to increase the amount of such courses in the specialist work already mentioned but also to equip men more thoroughly for the duties of intelligent citizenship by having a specialist course in applied economics and social science, with a view of training community leaders in these subjects and also in education, co-operation, recreation, etc.

Such leaders in the rural community would be a great source of strength to the nation, their broad training would give them a wide outlook and prevent narrow vision and class legislation. Such men, associated in each county with the agricultural representative, and a home-economics trained woman, would make a trio of workers in each

rural community that would in time give unsurpassed results.

It is also becoming more necessary for our colleges to give more thorough courses in agricultural journalism, more men must be trained along



F. C. HARRISON, D.SC., F.R.S.C.

these lines, and the instruction must be broad and comprehensive.

Leaders educated for such work should be able to present to the community sound doctrines and sound economics. Our national welfare, rural prosperity and happiness must find adequate expression and interpretation in the agricultural journal.

DEMONSTRATIONS RATHER THAN LECTURES

BY DR. G. C. GREELMAN, B.S.A., LL.D., PRESIDENT, ONTARIO AGRICULTURAL COLLEGE

THE high prices of farm products, the scarcity of live stock, the general upsetting and unsettling conditions in Europe, and the requests for farms by thousands of returned men, are all contributing factors toward the new interest that is being manifested in agriculture in Canada.

In Ontario, moreover, the successful entrance into politics of a farmer's party has added an entirely new element to the ordinary hum-drum of country life, and bids fair to shake up the whole Dominion. When it settles down, what will the colleges do to meet the new conditions, and what will be demanded of us?

In the first place we shall be expected to know what we are teaching. Too long we have been teaching "principles", and "sciences underlying" and "facts proven by experiment", etc., etc. without a real knowledge of their adaptation to actual farm conditions.



G. C. CREELMAN, B.S.A., LL.D.

Until actual farm surveys are made over a large area, taking in all phases of farm activities, throughout each season of the year, noting every farm operation, its cost and its relation to the rest of the work: not until then can we really advise farmers conscientiously, what in their particular locality, is actually the best kind of farming for them to undertake.

The amount of information already obtained by college men in three years in this province has been of enormous benefit and the possibili-

ties opened up cannot even be estimated. As only college trained men can do this work and as these men again can be assigned to teaching farm management in the winter time, new college men will get the inspiration, and will start systems of farm accounting all along the line.

The agricultural college, then will become more practical in its teaching, more thorough in its investigation more definite in its aims.

Less lecturing to students, and more demonstrations and discussions and personal investigations are already becoming the rule. Besides the questions of 'Why' farmers should do this and that, the young farmer is asking 'How'. We must answer, by laying drains, driving tractors, judging live stock, selecting seed grain, making a good road, pruning the orchard, selecting the best hens from the flock, valuing soils, knowing our weeds, etc. Not only must we show him but we must let him try it out while at college. He must decide for himself, and he is quite capable of doing it, but he must be given every opportunity of learning what is the best method, by actually doing the thing itself in overalls.

If then we can "do" these things, and at the same time know the "why" as well, and in addition give the lads a good working knowledge of English, both written and spoken, then we should expect not only support and appreciation from our constituents, and our governments, but we should look for the establishment of practical high schools as feeders to our agricultural colleges.

TRAINING FOR GOOD CITIZENSHIP

J. B. REYNOLDS, M.A., PRESIDENT, MANITOBA AGRICULTURAL COLLEGE

WHAT is this New Era we talk of? It is assumed that the war has brought about a new condition of affairs, or has induced new thoughts, new hopes, new convictions. But has it? And if it has, what is the nature and meaning of the changes?

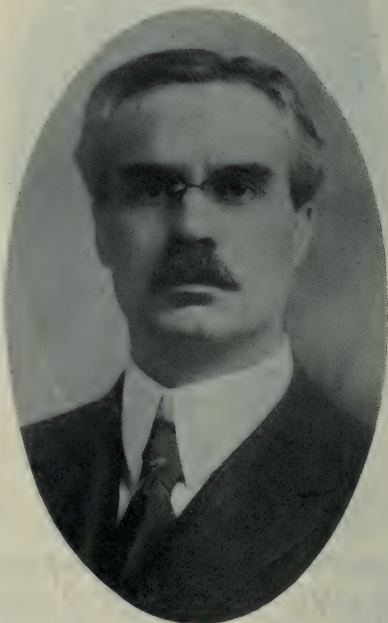
The war has certainly laid upon us the burden of a huge national debt, and at the same time, while we have been spending the money which the debt represents, we have acquired, both nationally and individually, habits of extravagance. The materials of living are more expensive than ever before, and more than ever before the people are buying the expensive things. For example, the cost of travelling has increased at least twenty per cent, and yet not only are more people travelling than ever before, but more people are travelling by the more expensive first class, and relatively fewer second class. Simplicity and economy of life are qualities that have been laid aside as old-fashioned. This is one phase—whether passing or permanent I do not venture to predict—of the new era. The debt seems to have more or less the look of permanence. How about the extravagance?

In the new era following the war there is imposed upon us an obligation to the men who fought for us, and particularly to the men who fought and died. That obligation is first of all a material one. We must provide with the utmost generosity in our power for those who are disabled in body or mind, and for the dependents of those who have died. Those obligations are easy to admit. To carry them out will not be so easy.

But tasks in hours of insight willed
Must be through years of gloom fulfilled.

The new era has brought a tremendous political and social upheaval.

Crowns and thrones are perishing, kingdoms are rising and waning, political parties, social distinctions, and industrial privileges are being thrown to the scrap heap. Labour in the factory and in the field is insisting on a fairer division of the products of labour, and that insistence cannot long be ignored or withstood. Our so-called democracy is being probed to its founda-



J. B. REYNOLDS, M.A.

tions, privileges are being questioned, and equality being insisted upon with new emphasis. An awakened public consciousness, or conscience, is a mark of the new era, and this public conscience is, let us fervently hope, a response to the call of our illustrious dead, that we, in making our country a country worth dying for, shall make it a better country to live in.

If ye break faith with those who die
We shall not sleep, though poppies blow
In Flanders Field.

What have the agricultural colleges to do with these phases of the new era? On the material side, to stimulate with renewed efforts the development of the greatest of our natural resources—the land. On the social side, to train young men and young women for country life. And politically, to teach right conceptions of public duties.

The agricultural colleges can stimulate production through its research departments. Science for four years used its utmost ingenuity and inventiveness in the arts of war and death. If the same amount of time, money, and scientific knowledge as has been spent through four years on war, could now be spent on the arts of life and peace, we should know then of a surety that we were living in a new era. Problems innumerable await the scientific investigator,—problems of soil management, of crop and animal improvement, of the control and mitigation of pests and diseases. To have this work properly done, we need trained investigators, and Canada at present has no co-ordinated means for training scientific investigators. A manufacturing concern with its large organization of capital and labour can afford to carry on its own research and is beginning earnestly to do so, and the manufacturing concerns are enticing trained investigators away from even public service. Agriculture is so individual and unorganized that no single agricultural interest can afford to conduct investigations. In any event, scientific investigation should be conducted at the public charge, and its discoveries announced in the public interest. Agricultural investigation is of such tremendous public importance that the expenditure of public money for this purpose has long been the practice. The colleges need more public support for this purpose, and the investigator must be given time to mature his results patiently, accurately, and truthfully.

The agricultural colleges are

charged with the responsibility of proclaiming the gospel of a better and a better agriculture in all the highways and byways where farms are to be found. Perhaps this business of extension is at the present moment even more pressing than that of research. Agricultural science is in advance of agricultural practice. This lagging of farming practice behind agricultural science is doubtless partly the fault of the colleges, but now with the tremendous demand for the production of wealth, no means for the improving of farm practice may be neglected. To lower the cost of production by the best farm management, to improve our soils by the best known methods of cultivation, to improve the herds by the best methods of breeding, to control weeds and diseases, all these things must be incorporated in the practice of the average farmer. These results can be attained best if the college will get close to the farm, study more accurately its problems and limitations, and employ every means available for extending scientific knowledge and applying it to farming conditions as they exist to-day.

The main function of the college is to teach, and the agricultural college is no exception to the rule. The agricultural college must teach what is good farming, and must teach it to those who intend to farm. It must teach young men and young women how to make a living on the farm. But it must do more than that. It must teach them how to live in the country, and how to make the country better to live in. The industrial expansion that has taken place during the last generation has upset the balance of population between town and country. The agricultural college must devise means of counteracting this drift of population. The problem is a difficult one, and the colleges have not been successful in this endeavour heretofore. The opposing forces have been too strong. The towns and cities

have become congested, with all the attendant evils of relatively diminished production, of people living remote from nature, of the creation of artificial desires, and of an irritable and excitable population. An intelligent, industrious, thrifty country people, with an intelligence which enables them not only to be good farmers, but also to protect their own interests from depredators, and to improve their own living conditions, are what Canada needs, and I do not know any greater mission to which the agricultural college can set itself, in order to become a worthy factor in making the new era a better era.

The farmer in Canada has broken into politics. A farmers' party, and a farmers' government, have been formed. No one with any political intelligence or political conscience, least of all the farmer himself,

believes that a farmers' government should be a class government. Whether or not this new power in politics will continue, will depend upon the detachment of the new party from mere class interests, and upon their devotion to the public weal. The important question here is, have the agricultural colleges, while they have been teaching the principles and the practices of good farming, been teaching also the principles and the practices of good citizenship? At least some of the colleges have seen this opportunity, and have not limited their instruction to technical agriculture. The present occasion emphasizes the fact that a man educated at the public expense at an agricultural college or elsewhere, must not turn his education solely to private profit, but is obliged therewith to serve the public

TRAINING NEEDED FOR RURAL LEADERSHIP

BY W. J. RUTHERFORD, B.S.A., DEAN OF THE COLLEGE OF AGRICULTURE, UNIVERSITY OF SASKATCHEWAN

KEEN interest is being taken in education by practically all our people both children and adults. This is especially noticeable in our rural population. In the past it has been customary for fathers and mothers to make great sacrifices in order that promising sons and daughters might receive a good secondary school and college education which would enable them to get away from the so-called drudgery of the farm and enter the more dignified and less arduous occupations. In those days college trained men and women were scarce but now the demand for a good education is general and the rising generation is demanding it. This is especially true of those whose future work will have to do with agriculture.

Farming is not the independent, self-contained occupation that it was a generation ago. Conditions have

changed from the pioneer days, and production has not only to do with supplying the demands of the home but it must aim to create an export trade. Farming is a real business, successfully carried on by men and women who are not only skilful in the art and practice, but are versed in the science of agriculture. Farmers to-day are not content to know only how to grow good crops they want to know also how to market them to good advantage. They are interested in the economic problems of their own communities and to a great extent in the problems of their customers in the city. Agriculture is both industry and commerce and affects both the rural and the city population. The agriculturist of to-day is not merely a practical farmer but is necessarily a social worker. Rural communities have problems which require college trained men to

solve. Organization, co-operation, and education are going hand in hand throughout the agricultural districts of the country.



W. J. RUTHERFORD, B.S.A.

Now that farmers are assuming the responsibilities of government they are in need of even clearer visions and broader education than ever. They have a serious task to perform

and they must be prepared to achieve it. They require a full conception of the principles of government along with all their necessary knowledge of agricultural science in order that they may serve the best interests of the people of Canada.

The college of agriculture of Saskatchewan offers two courses for young farmers. One for boys whose education, owing to pioneer conditions, has been neglected, and the other requiring matriculation leads to the degree of Bachelor of Scientific Agriculture. The first embraces the studies in the regular agricultural subjects along with farm management, economics, English and mathematics. It gives the sixteen year old boy an opportunity to spend the five winter months in each of three years fitting himself for good farming and good citizenship. The second is a four years university course fitting the student for farming or for professional work.

The college does more than teach its classes of young men. Through its research department it searches out and endeavours to discover new truths relative to agriculture and through its extension service it seeks to carry both information and inspiration to the adults in the remotest parts of the province.

THE DIGNITY OF PROFESSION MUST BE PROMOTED.

BY ERNEST A. HOWES, B.S.A., DEAN OF THE COLLEGE OF AGRICULTURE UNIVERSITY OF ALBERTA.

AGRICULTURE is the most fitting employment for men of honourable birth."

These words written some twenty odd centuries past were intended as a confession of faith by the old Greek warrior and writer and they are as timely in this Year of our Lord 1920, as they were in the far gone years when the message was first sent out. Nay, they are even more to the point in our day because when they were first spoken the dignity of the pursuit of agriculture had a recognition which

it lacks to-day. Although our people are ready to give due recognition to the farmer who makes money by his farm practices, and reaps a profit through the raising of stock, the growing of crops or the natural increase in land values, the reason is always that he has been able to acquire more goods than his neighbour. There is a lack of recognition of the fact that agriculture offers its people a life as dignified and as cultured as that of any profession known to any people. This lack of recognition

can only be due to the lack of knowledge of the history of the profession, to the failure to comprehend the



ERNEST A. HOWES, B.S.A.

tradition and fact before which the present day conditions and practices should stand out in relief. Evidence

is not wanting that we of the present day have slipped backward in our failure to recognize the opportunities for true culture and happiness to be found in the homes on the land; nor does this minimize the fact that economic considerations must always form the foundation for success in agriculture as well as in other walks of life.

It is only too true that nothing can be truly cultural that leaves its votary in a position where he would starve to death if someone did not fill him. On the other hand it is just as true that nothing is truly practical which does not leave him who practises it in a position to realize all his God-given opportunities for health and happiness.

There is today a marked forward movement in agriculture and agricultural education. Let us include in this movement a campaign for recognition by ourselves and for ourselves of the dignity of the profession for which we stand, not primarily as a money-maker but as that which offers the closest approach to what the Architect of the Universe intended as an ideal setting for a real home.

THE OBLIGATION TO PREPARE LEADERS.

BY F. M. CLEMENT, B.S.A., DEAN OF THE COLLEGE OF AGRICULTURE, UNIVERSITY OF BRITISH COLUMBIA

THE greatest need of this far Western Province is men, and men are coming from east and south by the hundreds to settle at the present time. New settlements are being started; new soils are being broken; and new communities established. The first problem is to take care of the new settler; guiding, advising, and educating him for his particular line of work.

British Columbia agriculture is very highly specialized—the dairy industry in certain centres, the poultry industry in certain centres, hardy fruits, tender fruits, bush fruits, strawberries, each in a particular

centre. High specialization is the general order of things. The second problem is to organize and establish the work of the college to meet the needs of the specialist.

The agricultural population of British Columbia is largely at the coast, or in settlements on the railways, or on the rivers and lakes. The settlements may be close together or they may be far apart; they may be almost isolated from each other or they may be in very close communication. From the point of observation—which to the visitor is usually the wharf or the station platform—the community may at

first look desolate and uninviting, but on examination it will be found that there is organization, a community spirit, a community feeling and a



F. M. CLEMENT, B.S.A.

lies the third problem. I believe I am safe in saying that in every community, large or small, the life centres community idea. What shall the spirit of the community be? Herein

around one, two, three or more individuals, but usually around one. Most communities have excellent leaders; in others the leadership is uncertain. The need is for more and better leaders in the new settlements, in the highly specialized settlements, and in the community life everywhere.

Whether or not the college can supply these leaders, it is impossible to say. Our methods and plans differ from those of any other institution in Canada, but we believe we have a safe and sound policy. It does not follow that agricultural college graduates shall be leaders or associate diploma men shall be leaders either, but an honest endeavour must be made to train and educate men in such a way that the light of their inspiration and their methods will reflect from their farms and permeate the whole community.

If the education of these men is sound and if they have the right ideals the farmers' movement will take care of itself. It is a question of men. The paid demonstrators and teachers have their places, but more particular attention must be paid to the hundreds of men who are living on their farms and making a success of farm work. These are the men who are the backbone of the movement. The agricultural college must be prepared to meet the obligation.

NOVA SCOTIA

POTATO GROWING CONTEST

PRELIMINARY to other measures which it is contemplated to adopt for the purpose of assisting the future development of agriculture in Nova Scotia the Dominion Atlantic Railway management and the Nova Scotia Department of Agriculture announce that prizes will be given for the best acre of potatoes grown in that part of Nova Scotia lying in proximity to the D. A. Ry. commencing west of the

town of Annapolis and continuing to and including the municipality of Yarmouth. For the purpose of this contest the country will be divided as follows—Division A.—West Annapolis and the municipality of Digby. Division B.—municipality of Clare, Division C.—municipality of Yarmouth.

The following cash prizes will be given Division A.—1st \$25, 2nd \$20, 3rd \$15 and nine addi-

tional prizes of an average value of \$10 each to be divided on the basis of the scores made by the judges to the nine next highest. Division B. and C.—1st \$25, 2nd \$20, 3rd \$15, and seven additional prizes of an average value of \$10 each to be divided on the basis of the scores made by the judges among the seven next highest competitors.

CONDITIONS.

Entries for this contest must be made with the Secretary for Agriculture, Truro, or with the General Freight Agent of the D. A. Ry., Halifax, before May 31, 1920.

The minimum size of field for which entry will be accepted must be one

acre, but this need not necessarily be in one single plot.

Every field for this competition must be sprayed with Bordeaux mixture, not less than four times, to prevent blight and subsequent rot. An improved dust that will control the development of blight will be accepted instead of the liquid spray. The most important points that will be considered in judging this contest will be the yield of marketable potatoes, freedom from rot, and evidence of the best methods of cultivation during the growing period.

Arrangements are being made to place an experienced man in the above mentioned territory to co-operate with the farmers as to the best methods for the general development of the agricultural industry.

CLOVER SEED GROWING IN NOVA SCOTIA

DURING the past six years a considerable effort has been made by Nova Scotia farmers in the production of clover seed. This industry has been stimulated by the high prices in recent years which are expected to continue to prevail. One of the chief difficulties in former years has been the threshing of the crop. This drawback has now been largely overcome by the use of three hullers of large capacity which are operating in the province. One of these is owned by a group of farmers about Summerside in Kings County, another is owned by a group in the vicinity of River John in Pictou

County. The third is a government owned huller which is available for any part of the province where there is a reasonable amount of clover to be threshed. Some assistance in the purchase of the two community owned machinery was given by the provincial Department of Agriculture for the purpose of encouraging the clover seed industry and it is with the same end in view that the government owned huller is being moved about to accommodate districts which as yet have not sufficiently developed the industry to justify purchasing the machine.

NEW BRUNSWICK

DRAINAGE DEMONSTRATION WORK

BY O. C. HICKS, B.S.A., INSTRUCTOR IN SOILS AND CROPS

THE drainage demonstration work carried on by the department in this province this season is educational in its character whereas actual trenching operations

for underdrains have been conducted each season heretofore.

The service of a drainage surveyor is offered, upon application to the Department, to any farmer who con-

templates the undertaking of drainage operations. Should a survey indicate that a system of underdrains is required, a working plan will then be prepared of the proposed installation of tiles. Public field meetings to which farmers were invited, were held at the conclusion of the drainage surveys made on farms in different counties. In some instances the field meeting to discuss land-drainage was made the occasion of a farmer's picnic where the women and children heard discussions upon congenial topics.

Interested farmers, forming a party, were conducted over the area included in the survey and encouraged to discuss its topographical and physical features relating to its drainage. Where a plan for underdrains had been mapped the map was examined and its especial features explained. From the profile working-plan of a ditch the method of setting up a grade-line for laying the tiles true to grade was demonstrated in the field. A lecture "Drainage Procedure", with black-board demonstration and illustrative material, followed the field examina-

tion. The superiority and defectiveness of various grades of clay and cement concrete drain-tiles was shown. Questions relating to the manufacture and transportation of tile were also discussed. Clay drain-tile is not manufactured within the province, consequently the work on many projects is precluded.

To the farmers of Westmorland and Albert Counties in particular the problems of reclamation and drainage of marsh is a matter of grave concern. Many thousands of acres of hay-meadows have been devastated by tidal waters during the past two years. A strong sentiment was expressed in favour of government aid to reclamation work of this kind, such as a cash bonus toward the purchase of suitable trenching machinery for the construction of open ditches and re-building dyke on a large scale. The attendance at the series of meetings was proof of the interest in this subject while the argument and discussion of the drainage problem showed an appreciation for a comprehensive plan for government assistance to farm drainage.

ONTARIO

AGRICULTURAL DEVELOPMENT IN NORTHERN ONTARIO

FARMING operations are being carried on through all accessible parts of the clay belt of northern Ontario. This large arable area extends along the lines of the Timiskaming and Northern Ontario Railway, and the Trans-continental Railway, for several hundred miles; along these railway lines the country is dotted with settlers homes, especially from New Liskeard to Hearst. A great deal of this territory has been burned over by forest fires, the fire of 1916 having left many acres bare but easily cleared. Settlers are taking advan-

tage of the assistance the fire has given and are assured of security from future devastations because the inflammable material which is a menace to the safety of the settlers has been burned up.

The towns and villages of northern Ontario, which were destroyed in 1916 and previous years, are growing up bigger than ever and are providing local markets for all farm produce grown in the vicinity. The chief industries of these towns are mining and pulp wood operations, and many thousands of people are employed in both lines of work. The magnitude

of the pulp industry may be gathered from the statement for August of the traffic returns for materials shipped out. During the month of October, 1919, the shipments totalled, pulp wood 6,265 cords, wood-pulp 8,248 tons, and paper 6,682 tons. The northern forests, outside the fire swept areas, are rich in material for the paper industry and the pulp-wood camps give winter employment to many of the settlers who work on their farms during the summer.

The markets afforded by these towns make farming a profitable summer occupation. Staple crops, such as potatoes, turnips, hay, and grains, are in good demand, and live stock is readily disposed of at good prices. The great drawback, so far, to the northern settler has been his ignorance of the best varieties of crops to grow and the best methods to adopt in his farming operations. In order to assist in this work the Ontario government has established demonstration farms and experiment stations throughout the northern districts. The purpose of these farms is to test the various crops under varying conditions and record results obtained. Very careful records are kept and information is supplied free to the settlers. The principal farms in the north are located at Monteith, New Liskeard, Matheson on the T. & N.O., and Kapuskasing on the Transcontinental.

THE MONTEITH DEMONSTRATION FARM AND SCHOOL OF AGRICULTURE.

The Monteith Demonstration Farm, about 220 miles from North Bay and 35 miles from Cochrane, contains 800 acres, 150 of which are under cultivation, about 150 in pasture and the balance is still in its virgin state. This farm is well equipped with modern buildings, farm machinery, and live stock. The cattle are all pure breds of the milking strain of Shorthorns. A flock of

fifty Shropshire ewes is maintained and this year fourteen pure bred ram lambs have been raised for distribution among the northern settlers at \$15 each. This is one of the best flocks of sheep in northern Ontario and is made up of individuals of exceptional merit. About 60 pure bred Yorkshire hogs are reared annually and these are also supplied to settlers at reasonable prices. Several pure bred Clydesdale mares are kept on the farm as well as a number of good grade horses. The large barn, which was built in 1916 to accommodate the cattle owned by the settlers whose buildings had been destroyed, is thoroughly equipped for the accommodation of the farm stock. Buildings for the housing of sheep, swine, etc., have also been erected.

Northern Ontario now possesses a school of agriculture. This school building, which is located on the Monteith Demonstration Farm, is situated on the northern bank of the Driftwood River and was erected in 1919 by the provincial Department of Lands, Forests, and Mines. It is a two story edifice with a commodious basement, and includes offices, dormitories, dining room, and lecture rooms. It is now equipped to accommodate about one hundred students who attend the various short courses in agriculture and household science held there each year. These courses are becoming very popular among the young men and young women of the north; the girls' course being especially well attended. It is planned that a short course of two weeks' duration in stock and seed judging will be held at this school in April 1920. This course will be attended by junior farmers from the northern districts who are winners in the acre and feeding competitions. Instruction will be given to these boys free of charge; their travelling expenses, and expenses while in residence will be paid for by the provincial Department of Agriculture.

This free instruction is given as prizes for various competitions and the funds are supplied to the province by the federal department under The Agricultural Instruction Act grant.

There are two advantages gained by giving these short courses at the Monteith School of Agriculture. The first is that it overcomes the difficulties of over-crowding that would be experienced if the course were held at Guelph where the college enrolment has reached its limit, and the second advantage is that the boys will learn methods practicable under northern Ontario

convention for that section of northern Ontario and over fifty teachers attended, besides the staff.

The Monteith Demonstration Farm is an example of what can be accomplished in the clay belt of northern Ontario. The farm presents an excellent appearance from the station, and the campus and grounds, which embrace about twenty-five acres, are laid out to good advantage. A very pretty scheme of planting is being followed out and roadways are being made through the property according to attractive landscape plans.



AGRICULTURAL SCHOOL AT MONTEITH, ONT.

conditions and will see the results of experiments carried on right in their own latitudes.

The courses in domestic science, which have been conducted at this school in co-operation with the women's institute branch of the Ontario Department of Agriculture have this year been extended to five weeks in order that more detailed work might be taken up. The lectures and demonstrations are given by fully qualified instructors under the supervision of a lady principal, acting in conjunction with L. H. Hanlan, Superintendent of the Demonstration Farm. This year the school was the centre for the teachers'

DEMONSTRATION FARM AT MATHESON

The Matheson Farm comprising 60 acres all of which are under cultivation, is operated by the northern development branch of the Department of Lands, Forests, and Mines for the province of Ontario. This farm is situated in Timiskaming District twelve miles south of Monteith on the T. & N.O. Railway. Most of the work carried on at this farm is with good seed for distribution among the settlers. Barley, oats, peas, and wheat are tested out for experimental purposes and clover seed of high quality is regularly produced. Peas have given excellent yields and

the early short strawed varieties are successfully grown over the whole district. Timiskaming is now one of the best pea growing districts in the Dominion of Canada and thousands of bushels of peas are being sold to the seed houses in Toronto and other places where they are again sold to the farmers. It is a regrettable fact that by this means the northern Ontario peas have been losing their identity, however, when the farmers organize to form pea growing clubs they will be able to market their own products, realize better prices, and advertise their districts, thus retaining

The planting of early maturing varieties of peas, oats, and barley allows a long fall season after harvest for the ploughing and preparation of land for the next spring, as well as insuring these crops against early fall frosts which are prevalent in some parts of northern Ontario.

Very good results have been achieved this year with fall wheat. Fall wheat has been grown successfully for a number of years at Matheson and in the vicinity, and this year the grain has been of an exceptionally good quality. Besides the grain grown for distribution on the Mathe-



FIELD OF ALSIKE CLOVER GROWN FOR SEED AT MATHESON, ONT.

their identity in the markets of the Dominion. O.A.C. No. 21 barley has been giving excellent results for a number of years. It matures in about eighty-five days and on account of its early maturing and usually rich harvest it is one of the surest cereal crops in northern Ontario. The average yield is good, being about forty bushels to the acre for a period of years. Among the most successful varieties of oats grown is the O.A.C. No. 3 oats, which, from seeding time to maturity, requires but about ninety days.

son Farm several hundred bushels have also been produced by farmers in the same locality and this is all being sold to settlers for seed.

A new metal covered barn, 40' x 80', has been erected on the Matheson Farm this year for the protection of crops and live stock. The supervision of the work on the farm is under L. H. Hanlan, Superintendent of the Monteith Farm, and the results of experiments conducted are recorded in the offices at Monteith.

NEW LISKEARD AGRICULTURAL HIGH SCHOOL

At New Liskeard, on the experimental farm established by the Ontario Department of Agriculture, preparations are being made for giving further instruction in agriculture to students taking high school work. The need of agriculture in the high school is being emphasized in the rural and urban sections of northern Ontario. This large area is essentially agricultural and many of the students now entering high school will follow agricultural pursuits upon graduation, and keen interest has already been shown in the study of scientific agriculture.

On the New Liskeard Farm is a judging pavilion with a lecture room above. This lecture room is now being used as a continuation high school, but on completion of the high school, which is under construction, this room will be utilized for the agricultural part of the high school course. It is expected that the work in the New Liskeard high school, which is now being conducted under the Department of Education, may shortly develop into a regular two years' course in agriculture which will be arranged so as to be of practical value to the rural students in the vicinity. Considerable assistance is now being given by the agricultural representative and other officials of the Department of Agriculture in the working out of the agricultural course in the high school.

A large barn is now under construction on the farm in close proximity to the town. Here the demonstration cattle, sheep, and swine will be kept for the purpose of

class work at the judging pavilion. Pure bred animals of good type are to be maintained. In this way the agricultural students in the high school will be thoroughly equipped with knowledge of good live stock and will also receive instruction in the growing, judging, and handling of cereals and other grains and crops.

One of the apparent needs of practically the whole agricultural region of northern Ontario is under-drainage. In some parts the surface is very level and affords little natural drainage. Drainage demonstrations are annually held and hundreds of people are instructed in the best means of improving the condition of their soils and in increasing the yields of their crops by systems of drains. The drainage work is supervised by the Department of Physics of the Ontario Agricultural College and is of a three-fold character. First, surveying and levelling work; second, demonstration work; third, investigation work. These three branches are being developed and advantage is being taken by the farmers of the assistance afforded. It has been clearly demonstrated that the northern lands are improved by under-drainage and in fact the swamp areas can be reclaimed only by thorough systems of drains. The benefits derived are, the improvement of the texture of the soil, the production of uniform moisture content, the lengthening of the growing season, and deepening of the root zone. These several advantages are being demonstrated to the farmers of northern Ontario through the activities of the Department of Agriculture.

ONTARIO

COURSES AT THE KEMPTVILLE AGRICULTURAL SCHOOL

BY W. J. BELL, B.S.A., PRINCIPAL

THE Kemptville Agricultural School is again arranging a series of short courses to be conducted from January 5 to March 27. The main school building will be completed early in January and will be available for class room purposes especially for lecturing and demonstration work in household science, while two class rooms are being equipped, one as a dormitory and another as a dining-room for the accommodation of a limited number of short course students. Board can also be secured in homes convenient to the school at reasonable rates. The regular two years' course in agriculture and household science will be commenced in the autumn of this year.

Three short courses are being held. The herdsmen's course from January 5 to February 7 is designed for all interested in the care, feeding, and management of all farm live stock. This course includes such subjects as composition of feeds of proven value; feeding problems; milk and cream testing and dairy bacteriology; breeding problems; first aid veterinary studies; stock judging and a brief study of practical English.

The farm power course from February 16 to 28 will deal with the principle, operation, and management of gas engines. Lectures will be given on the parts and the principles underlying the operation of gas engines

by specialists supplied by different engine and tractor manufacturers, and the Department of Agriculture. Practical tractor demonstrations will be given daily on engines furnished by tractor firms, while engine trouble will be carefully studied and rectified. Other branches of farm economics of use to practical farmers will also be dealt with by competent demonstrators and lecturers. Household science, home nursing, poultry, and farm dairy course covering four weeks from March 1 to 27 is being conducted in co-operation with the Institute Branch of the Ontario Department of Agriculture. In this course a series of lectures and demonstrations in home cookery, sewing, home nursing, etc., will be carried on and in addition instruction will be given in poultry raising, soft cheese making, the care of milk and cream, sanitation and sterilization. This course is intended to increase the efficiency of all who are or will be engaged in the management of a home. Only information of a practical and helpful nature will be given, non-technical terms will be avoided. The institutes Branch is providing the best qualified lecturers and demonstrators available to handle this course, and it is intended that the rural girls and women will have the advantage of instruction similar to that given at the leading domestic science schools of the province.

COUNTY PLOUGHING MATCHES

IN many of the counties in Ontario ploughing matches were carried out with great success during the past fall. In most cases these matches were the first of their kind

in their respective localities. They were carried on under various organizations but for the most part under the direct supervision of the agricultural representatives. Out-

side judges were engaged and in each case they were impressed with the excellent work and with the keen interest the farmers are taking in the ploughing competitions. In some cases two competitions were held in the county. There were two classes, one in sod and one in stubble. In some cases ploughing was done on the home farms while in others the

ploughmen's association secured a centrally located farm, for the purpose of the plowing match, where a real big day was spent, and tractor demonstrations were staged. From the success of this year's show it is probable that county ploughing matches will be much more general throughout Ontario in the coming fall.

MANITOBA

NURSERY MATERIAL FOR SCHOOL GROUNDS

BY B. J. HALES, M.A., PRINCIPAL, NORMAL SCHOOL, BRANDON

FOR three years the Brandon Normal School has carried on annual distribution of nursery material to the public schools of the province. The materials distributed are trees, shrubs, and perennial plants. This material constitutes a sort of by-product of our school work, as we have to grow trees and other material to demonstrate the culture of these plants to the students. The limited space at our disposal makes it

necessary that we distribute the surplus stocks from year to year. The distribution to 180 schools carried out last year amounted to 16,480 trees and shrubs, 600 poplar and willow cuttings, 168 collections of perennial flower roots, and 55 bushels of seed potatoes. At the ordinary retail price the material thus distributed had a value of \$2,925, which is more than the entire cost of keeping up the school grounds.

"One single idea may have greater weight than the labour of all men, animals, and engines for a century."—Emerson.

SASKATCHEWAN

SASKATCHEWAN INSTITUTIONAL FARMS

BY C. M. LEARMONTH, B.S.A., SUPERINTENDENT

THE Institutional Farms in the province of Saskatchewan comprise, farms located at the Moosomin Jail, Regina Jail, Prince Albert Jail and the Provincial Hospital for the insane at Battleford. The farm at the Provincial Hospital is the largest of our institutional farms and comprises approximately 2,471.79 acres. The farm at the Prince Albert Jail comprises 640 acres, six miles from the jail property and 37½ acres adjoining the jail. There is a section of broken prairie land or 640 acres adjoining the Regina Jail, six miles from the city, and the farm at Moosomin Jail comprises 320 acres. Another farm will be added when the Weyburn Mental Hospital is completed, the site having been now selected and no doubt immediate construction will be undertaken in the spring. These figures do not include a small acreage at the Boys' Detention Home Regina or 435 acres adjacent to the old Jail Farm, Regina, which is operated directly under the Public Works Department. The province with its 4,544.29 acres is therefore farming on a large scale.

The main policy in the operation of these farms, is to successfully operate them from a revenue standpoint, and utilize the available patient and prison labour to the best advantage. All those immediately connected with our farm operations endorse the policy of departing from wheat growing and bending our energy to the building up of flocks and herds that will do credit to these institutions and will compare favourably with similar government institutional farms found anywhere in this Dominion.

The farm instructors on the different farms are keenly awake to the possibilities of greater extension in live stock work and larger operations. Nothing adds to the interest and revenue of any farm like the successful handling of live stock. The figures

for the past year's operations shows the success which has followed the carrying out of this policy and makes it plain that future development of our farm operations must lie in the extension of live stock work.

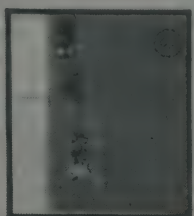
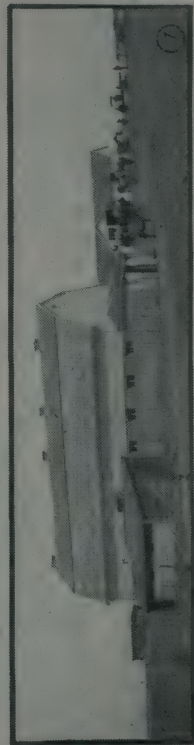
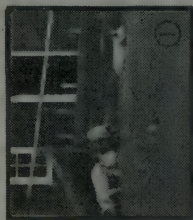
I beg to draw the readers attention to the fact that this article only deals with the actual farming operations at the provincial institutions and does not deal with any other interesting features which characterize these various institutions. In the Province of Saskatchewan all public institutions come under the Department of Public Works and this consolidated management seems to be working out very satisfactorily. All our work is done by trusty patients and prison labour. These patients and prisoners are under the supervision of attendants or guards as the case may be.

The farm at the Provincial Hospital at Battleford is a natural dairy farm. The hospital can consume all the farm products and although there has been a large increase in the dairy herd, we have as yet not been able to supply the hospital with the necessary milk supply and our enlarged poultry department is not yet at the stage where the needs of the hospital can be fully met. Our swine have done remarkably well. We have a fine foundation herd of pure bred Yorkshires. A new dairy barn is being erected this year and will greatly facilitate our work at this institution. The crop this year as well as last has suffered very greatly from unusual dry weather and the disastrous July frost in 1918.

At the Prince Albert Jail farm the land is rolling and the cultivated land has been cleared from bush. This is a stock farm with plenty of water and hay available. A number of grade Shorthorn females and grade female Aberdeen-Angus are kept and winter feeding of steers has been very successfully carried out on this farm.

PROVINCIAL HOSPITAL FARM.

1. Corner in pig runway. 2. Farm horses in front of implement shed. 3. Holstein cows. 4. A good dairy cow. 5. Bacon hogs. 6. Corner of poultry house. 7. Horse barn. 8. A pair of promising heifers.



In the fall of 1918 we tied up during the first week in December 40 steers to be stall fed, these giving us a carload of Angus steers and a carload of Shorthorns. They were a thrifty, uniform bunch and responded to heavy feeding. They were fed at different hours during the day and carefully watched to see that each steer was handling his feed, starting on a bulky ration of good straw, a green sheaf, chopped oats and some barley and turnips, with all the water and salt they would take. We gradually increased the concentrates until at the short finishing period we were using hay in place of straw, with some oilcake added, and the grain ration as heavy as they could handle economically. These steers cost originally ten cents per pound and weighed 38,540 pounds, a total cost of \$3,854. They were sold well on the Winnipeg market. on May 12, 1919, for \$7,243.99. One steer was slaughtered early in the season for which we only received \$67.28, making a total revenue of \$7,311.27. The price received per pound for the top carload was 16 cents which equalled the highest price ever paid for a carload of steers on the Winnipeg market. The previous year we received 14.55 per pound which was the top sale for the province of Saskatchewan.

Our first year's work with sows at the Prince Albert Jail Farm made a very favourable showing. We purchased 10 brood sows for \$400 and the returns for the year showed that we sold \$744.28 worth of hogs and have on hand at the year end 42 head.

The Moosomin Jail Farm is well fenced and cross fenced and under

good cultivation. Our steer feeding at this farm has been very satisfactory. Last year 32 head in all were fed at a profit of \$1,128.75. A new piggery was built last year and with an addition of a pure bred Yorkshire sow and use of a pure bred boar we are looking for good results with hog raising. Live stock and mixed farming are well established in this district and a profitable field for pure bred live stock should be open for this farm.

At the Regina Jail Farm good results have been obtained with range flocks and sheep, purchased by the writer in the Maple Creek range district in June 1918. In all 83 mature head and 41 lambs were bought. After pasturing they were housed in a straw shed and were fed in winter on straw and with a green sheaf added. The purchase price was \$1,650. Our sales show we realized up to April 30, 1919 from this band \$1,020.50, and we have on hand from original flock 65 head and also have the wool crop and lamb crop to account for before a full year elapses. We also purchased for this farm 20 pure bred Shropshire ewes of good breeding, mostly imported, and a pure bred Shropshire ram which will give us a good foundation flock for sale purposes. We also have a fine herd of pure bred Berkshire swine on this farm which bring us in a good revenue and we find a ready market for any pure bred swine we offer for sale.

The following table shows the live stock at the four farms for 1917-18, 1918-19. This does not include the 62 head of steers fed at Prince Albert and the 33 head fed at Moosomin.

	Horses.		Cattle.		Swine.	
	1917-18.	1918-19.	1917-18.	1918-19.	1917-18.	1918-19.
Battleford.....	30	34	38	64	122	101
Prince Albert.....	14	13	23	60	11	42
Moosomin.....	10	11	7	8	34	44
Regina.....	22	24	7	10	54	51
	76	82	75	142	221	238

	Sheep.		Poultry.	
	1917-18.	1918-19.	1917-18.	1918-19.
Battleford.....			166	424
Prince Albert.....				
Moosomin.....		85		
Regina.....		85	166	424

CO-OPERATIVE ORGANISATION PROGRESSING.

W. W. THOMSON, B.S.A.

DURING 1919 thirty-nine new agricultural co-operative associations were formed in Saskatchewan and nineteen associations were dissolved. This leaves a net gain of twenty associations during the year, a very creditable record considering that the total number of associations in the province has already reached 406.

The rapid growth of the co-operative associations' movement in this province, since its inauguration in 1914 is shown by the following statistics on associations actually reported to the branch:

1914, 102 associations with 2,850 shareholders,
1915, 173 associations with 5,537 shareholders,
1916, 279 associations with 9,444 shareholders,
1917, 304 associations with 12,459 shareholders,
1918, 329 associations with 15,123 shareholders.

The paid up capital of the associations reporting in 1914 was \$13,494.20 and at the end of 1918, \$230,002.86. The value of supplies handled in 1914 was \$239,320.42, and in 1918, \$3,664,222.39. There was an increase during the four years in the number of associations shipping live stock co-operatively from 9 to 41. These 41 associations in 1918 shipped 689 cars of stock valued at \$1,558,621.14. The total turn-over in all lines of business in 1914 was \$281,354.64, and in 1918, \$5,278,166.03. Since the reports of the individual associations are not required to be in the hands of the director of the branch until some time after the new year, it is not possible at present to state the turn-over for 1919. That they will show a substantial increase over last year is assured.

BRITISH COLUMBIA CANADIAN STOCK FOR HAWAIIAN ISLANDS

THE College of Agriculture of the University of British Columbia has given the services of one of its staff in the selection of an export shipment of dairy cattle to the Hawaiian Islands. The shipment consisting of eighteen pure-bred Holsteins and two pure-bred Jerseys was selected by Mr. J. A. McLean, Professor of Animal Husbandry of the

University. The request for this Canadian stock is the result of a visit which Professor McLean made to the territory of Hawaii last summer for the purpose of judging live stock at their exhibition. The shipment, which is composed of selected animals of the finest breeding and quality, left Vancouver at the end of November.

SHORT COURSES AT THE AGRICULTURAL COLLEGES

FOR the benefit of men and women, who desire to study agriculture in its various branches and are unable to attend the full courses held at the agricultural colleges short courses, extending from a few days to several months, are provided. A number of colleges have already made arrangements for their short courses.

At the Oka Agricultural Institute the live stock and poultry short course extends from February to the end of April. The annual short course in poultry husbandry given at the poultry department, Macdonald College, Ste. Anne de Bellevue, will be held from February 10 to 13 inclusive. It is intended to supply the demand for practical information in order to enable all interested to become more familiar with the principles of successful poultry keeping.

At the Ontario Agricultural College seven distinct courses are arranged for. These are:—

1st—Stock and Seed Judging, January 13 to 24.

2nd—Poultry Raising, January 13 to February 7.

3rd—Horticultural courses taken up in three parts,—

(a) Fruit growing, January 26 to February 7; (b) Vegetable growing, February 9 to 21, (c) Floriculture and Landscape Gardening, February 23 to March 6.

4th—Dairy courses including six branches,

(a) Factory course for cheese and butter making, January 2, to March 19; (b) Farm Dairy course January 29 to February 20; (c) Courses in Cow Testing for cow owners and official testers, March 22 to 31; (d) Course for Ice Cream making, March 22 to 27; (e) Course in Soft

Cheese making, March 22 to 27; (f) Dairy Instructors' and Dairy Managers' Conference, April 1 to 2.

5th—Beekeeping, January 13 to 24.

6th—Drainage and Drainage Surveying, January 13 to 24.

7th—Farm Power including tractors, gasoline engines, etc., January 27 to February 7.

The Manitoba Agricultural College, besides holding courses for returned soldiers, beginning the first of each month, has arranged for other short courses as follows:—

1. A four month's course for young farmers in traction engineering, live stock and field crops, poultry, dairying, and horticulture, October 21 to March 5, 1920.

2. Creamery and cheese factory course, January 6 to March 12, 1920.

3. Engineering short course, January 6 to March 5, 1920.

The Saskatchewan University is holding short courses on the internal combustion engines from January 7 to 26 inclusive, and February 4 to 23 inclusive. Each course will be of three weeks duration and will be held under the direction of the Department of Agricultural Instruction at the College of Agriculture.

Other agricultural schools and colleges are also preparing short courses for farmers who are able to spare the time to attend them during the winter months. The attendance at these courses during the past few years has testified to their popularity. They are proving a great help to the practical agriculturists of Canada.

PART III

Junior Agriculture

DEMONSTRATIONS, COMPETITIONS, AND CLASS-ROOM STUDIES IN RURAL
LIFE FOR BOYS AND GIRLS

SCHOOL GARDENS IN 1919

NOVA SCOTIA

BY L. A. DEWOLFE, B.A., B.S.A.

ABOUT 5,000 school children made home gardens in Nova Scotia this year. This is no great increase over the number of last year. In fact, we cannot look for much further increase in the near future, for the supply of specially

vest. The only way to secure that is to make the school year coincident with the calendar year. The best school gardens were at Marshville and River John in Pictou county, and South Berwick in Kings County.

One innovation was the conducting



SCHOOL GARDEN AT MARSHVILLE, PICTOU CO., N.S.

trained teachers has practically become stationary. Older ones are leaving the province or profession as fast as new ones are being trained.

Gardens on the school grounds are still somewhat unpopular. This will be so until we have the same teacher at both seed-time and har-

vest. of garden contests in the districts covered by travelling teachers. In each district we offered small prizes to the individual making the best garden, and also to the school making the best collective garden showing. The travelling teacher visited these gardens three times during the sum-

mer. The best district included 10 schools with 296 gardens, totalling $1\frac{1}{2}$ acres. This method of inspection was somewhat expensive. Next year, therefore, we shall modify it by organizing local contests, judged by local people.

In general, our teachers do not make sufficient use of the gardens from the educational standpoint. In River John, however, we have a notable exception. The teacher, Miss

Walley, organized her garden into a small township. She had her manager, her street committee, her weed inspectors, etc. From the garden, therefore, she taught very real lessons in civics. She has made a special effort to correlate the garden with every subject on the school course, and she has succeeded admirably. In time we hope to get other teachers to follow her methods.

ONTARIO

J. B. DANDENO, PH.D., (HARV.) INSPECTOR OF RURAL CLASSES

THE School Garden as a feature of agricultural education is tending to become more and more, as time goes on, and as its unction is becoming more fully understood, a permanent part of the

the fact that in securing land and in organizing schools in the past, the school garden or plot was not thought of, consequently no provision was made to secure suitable land. Moreover, it was formerly thought that



CLASS AT WORK PLANTING IN SCHOOL GARDEN OF THE PETERBORO NORMAL SCHOOL,

school accommodation in Ontario. All important educational advancements are necessarily slow because of the very fact that they are educational, and the school garden movement is no exception. Progress has been somewhat hindered because of

educational machinery consisted almost wholly of books and class-rooms. These two hindrances are being removed slowly but surely.

It should be kept in mind that agricultural education is applicable to villages, towns and cities, and,

though the securing of land in cities is usually much more difficult than it is in the country, rapid progress is being made in cities where the nature of the work is being understood.

The school board in the city of Ottawa paid \$13,000 for a school garden, and from the reports of the inspectors and others concerned, the money was well spent. There are also splendid school gardens in London, Stratford, St. Thomas, and Brantford. All of the normal schools are provided with gardens and excellent work is being done in these schools by means of these gardens.

The number of schools undertaking school garden work in Ontario is increasing steadily year by year as indicated from the following figures, —1914, 208; 1915, 222; 1916, 324; 1917, 466; 1918, 588; and in 1919, 700 (approx.) Most of these gardens form a part of the regular school property, but, as might be expected there is a considerable number of gardens on land secured only temporarily. It should be said to the credit of the farmers that in very many cases the land was loaned to the school board free of charge. The spirit shown in such acts as these



SUMMER SCHOOL AT WHITBY,
CLASS AT WORK IN THE SCHOOL GARDEN.

TREND

Some years ago the school garden was thought to be nothing more than a fad, and, in some cases ridicule was directed towards such schools as made a beginning, but this feeling has practically passed away. It was thought that the long summer vacation would prove an insurmountable difficulty, but this difficulty—and it has proved a considerable one—is being solved quite readily and is not proving such a difficulty as it was once thought it would.

demonstrates more than words the trend of the school garden movement.

RESULTS

It is not easy to summarize the tangible results of any educational development because the results are mainly in the make-up of the pupils concerned, but it is quite apparent that school garden work appeals to boys and girls and secures their interest. One result is, therefore, that it provides something which will make the course of study more rational.

Not only is the school garden an important part of the general course of study, but it also stimulates the pupils with a love for neatness about the school grounds; this has been quite noticeable. The garden can be made, and is being made to some extent, a source of material for study in arithmetic, geography, art, and composition. This aspect of the work will at once be seen to be far-reaching.

It is not expected that, for some years to come, much experimental work can be done in the garden with pupils of public school age, but for all that, here and there surprising results have been obtained and the

parents of pupils are awakening to the fact that some important experimental work can be done even in public and separate schools.

The financial result of the school garden ought not, perhaps, to be mentioned, but, at the same time, during the past four years it has drawn the attention of many people, including children, to the fact that the financial returns from even a very small plot can be of considerable value. But the school garden is an educational feature, and the results are educational. Even if the financial returns were nothing at all, the school garden is well worth while.

PROGRESS IN ELEMENTARY AGRICULTURAL EDUCATION

NOVA SCOTIA

BY L. A. DEWOLFE, M.SC., DIRECTOR OF RURAL SCIENCE SCHOOLS

INSTEAD of paying grants to regular teachers for doing rural science work, we are employing 10 travelling teachers who devote all their time to this work. We think this an improvement. In many cases the teacher did as little as possible and still qualify for the grant. To them agriculture was secondary. The travelling teachers do excellent work because agriculture and home-making are their only subjects.

The loss to teachers through withdrawal of the rural science grants is partially made up paying larger grants to those who attend the summer school. In other words we pay teachers to come to summer school, believing that their interest will lead them to do the work throughout the year.

Rural science has expanded from school gardening to include all phases of home-making. Canning, sewing, cooking, community work, and woodwork, are as much home-making subjects as is agriculture. Every

subject helps the other subjects.

School exhibitions have become nearly self-supporting. At first the government paid nearly all the prize money. Now, however, we are rarely ever called on for prize money.

Education through play is one of our new policies. We find that the teacher who organizes and supervises the children's play and sports gets a very much better response when she calls on them for work. At our recent school exhibitions sports have taken a prominent place. Our training school at Truro has become more practical; and actually carries on play and sports as well as agricultural and home-making projects. The travelling teacher, herself, has become more of an organizer and less of a teacher. Through her efforts, therefore, we are getting a larger band of workers throughout the province than we had at first hoped for.

QUEBEC

BY CYRILLE F. DELAGE, SUPERINTENDENT PUBLIC INSTRUCTION

AGRICULTURE is taught regularly in all primary schools of the province, beginning with the third year of the course. In the first and second years, elementary principles, under the heading of Object Lessons (*leçons de choses*), are given on plants, animals and the farm in general. Agriculture is also included in the programme of normal schools.

The school gardens, which are found in a very large number of school districts and which were established as a result of the lectures given by the school inspectors on this subject during the last few years, and the home gardens, organized by the agricultural representatives appointed in about thirty counties of the province, complete the agricultural instruction work which is begun in the school. In 1917-18, there were 945 school gardens, kept by 22,761 pupils.

The completion of this work is found in the agricultural school fairs, which are staged each fall in a number of districts by agricultural repre-

sentatives, with the help of school teachers and members of the clergy.

Domestic science teaching has made wonderful progress during the last fifteen years in the province of Quebec. Statistics for 1917-18 show that there are 52 domestic science schools which are attended by 7,469 pupils (girls). In rural domestic science schools, which are in a majority, the course includes fairly complete principles of agriculture under such title as "Care of the garden", "Poultry", "Dairying", "Spinning and weaving of wool", etc., etc.

Agricultural teaching in the province of Quebec is completed, for the boys, at the schools of agriculture at Oka, Ste-Anne de la Pocatière, Ste-Anne de Bellevue, and for the girls, at the superior domestic science schools of Roberval and St-Pascal. The first were attended in 1917-18 by 527 pupils and the last by over 300 pupils.

Such is, in its broad lines, the organization of agricultural teaching in the province of Quebec.

ONTARIO

J. B. DANDENO, PH.D., INSPECTOR ELEMENTARY AGRICULTURAL CLASSES

AGRICULTURAL education is in one sense, as old as humanity, inasmuch as it has in large measure in the past been considered to be the gaining of information which may be applied to serve one's ends. To learn was to follow the methods of others; to receive instruction and to apply it, was the method; these, however, are not essentially *education* as we have it today. A farmer may be very successful by simply following the rule of thumb method. Such a farmer is, however, not even an agriculturist as we understand the term now. Agricultural education is education resulting from the use of agri-

cultural principles as a basis. For example, a lesson on corn judging may be made a lesson for the development of the powers of observation and of judgment, including the development of the reasoning faculty. Thus far this topic includes no more than would be included in an ordinary lesson in elementary science. But it may be more than this, when application is made to the growing of corn as a means of increasing the resources of the province, to the improvement of the living conditions of the people, to the added wealth and comfort of the family, and to the experience of the pupil himself. Whether the pupil enters one occupation of life or

another, such a lesson is educative in the best sense because it tends towards mental and moral development. The pupil may enter the occupation of farming later on and put into practice what he may have gained in the judging of corn, but the lesson itself was not vocational, it was of educational value no matter what occupation was followed afterwards.

Agricultural education recognized as a special subject of the school programme in Ontario began about seventy-five years ago with a text book by John Simpson and a course was provided in the Toronto Normal

important part but it is by no means the whole thing nor yet even the most important part. Later on appeared a text book by Mills and Shaw and another by C. C. James. In both these books the catechism method was departed from to a large extent but the matter was so arranged as to be largely informational. Perhaps the authors realized that teachers would likely be untrained, or poorly trained, in agriculture, and consequently prepared the texts with this in view. Thus far well and good, but these books were at once put into the hands of the pupils as texts for them—so much to be learned per day.



TIDYING UP AFTER PLANTING, BIRCHCLIFF SCHOOL, S.S. NO. 15 (SCARBORO) JUNE 6 1919.

School in 1847. Whatever success was achieved is at present not easy to see because the subject took no very firm hold of the course of study. However in 1870 Dr. Ryerson, knowing the need of greater knowledge on behalf of the farmer, especially of the future farmer, published a text book to be used in schools. This text followed the ordinary catechism method—question and answer—expecting the teacher to ask the question and the pupil to repeat the answer. This shows that agricultural education meant chiefly the gaining of information. No doubt the gaining of information is an

Inasmuch as this was the case these texts were little better than Ryerson's catechism text.

With such texts as these for a subject like agriculture it is no wonder little progress was made in agricultural education. When the methods implied in the use of such texts were abandoned in Ontario (1914 or 1915) progress began. The aim of the method now employed—the laboratory method as far as possible—is to develop the individual, making use of actual material and keeping the informational aspect in the back ground.

The manual made use of in the

public schools of Ontario merely gives advice as to material to be employed and the method to be adopted. Whether the pupils gain much or little information is only of secondary consideration. In fact the manual is so arranged as to require the maximum of the laboratory method and the minimum of text.

The introduction of agriculture (the subject is optional) to the high schools in Ontario is not as rapid as might be expected, largely owing to the overcrowded curriculum especially in the lower school. At present there are thirty-three high schools carrying on the work even in spite of the heavy course of obligatory subjects, and it should be said that though some schools dropped the subject after introducing it, the only reason for discontinuing was the inability to secure a qualified teacher. It

was never, so far, discontinued for any other reason, showing that when once introduced the subject holds its own in spite of the fact that it is optional and only a bonus for examinations.

In 1919 some 1,500 public and separate schools, including both rural and urban, conducted classes in agriculture according to the prescribed regulations, and qualified for grants according to the schedule outlined in circular 13, 1919.

The progress in agricultural education may be seen, to a large extent, in the following table which gives the number of public and separate schools qualifying for grants since the commencement of this work in these schools.

The public and separate schools qualifying for grants commencing in 1903 are given in the following table:

Year.	No. of Schools	Year.	No. of Schools	With School Gardens	With Home Gardens
1903.....	4	1911.....	33	.....	.....
1904.....	7	1912.....	101	.....	.....
1905.....	6	1913.....	159	.....	.....
1906.....	8	1914.....	264	208	56
1907.....	2	1915.....	407	222	185
1908.....	14	1916.....	585	324	261
1909.....	16	1917.....	989	466	523
1910.....	17	1918.....	1,020	588	432

The grants to boards for 1903 to 1909 were larger than they are now and those to teachers under the same conditions as now were also larger.

The number of high schools qualifying for grants is as follows:

1913,	2 schools
1914,	11 "
1915,	15 "
1916,	21 "
1917,	24 "
1918,	28 "
1919,	33 "

In THE AGRICULTURAL GAZETTE of October, 1919, appears an article

by J. W. Gibson, Victoria, B.C., which seems to be based on an article in the June number of THE GAZETTE by Mr. John Dearness. For those living in Ontario no comment on that article is needed, but it should be pointed out to people of the other provinces that agricultural education in the schools of Ontario is not vocational. The laboratory method, as has already been pointed out, is used almost without exception. The aim of the manual is to secure the laboratory method; it is not vocational. A copy of it may be had for 29c. plus 7c. postage from the Wm. Briggs Co., Toronto.

It might also be stated that from 1903 to 1914 or thereabouts the so-called agricultural nature study referred to by Mr. Dearness was the kind chiefly made use of in Ontario. The above table indicates the progress during that period—practically none. Nature study is now an obligatory subject in the public and separate schools in this province and has been for some years. To call the work undertaken under that

in this province have accomplished so much of real educational value to the rising generation.

One of the chief hindrances to progress in agricultural education exists in the high schools. Many high schools are ambitious to carry on upper school work, which is really university work, and in order to do so they make provision for classes of one or two individuals. The minimum number for a class in agriculture is



RENFREW COLLEGIATE INSTITUTE AND GARDEN WITH POULTRY
HOUSE AT THE RIGHT.

This is the first collegiate institute having a poultry house as part of the equipment.

heading agriculture would certainly discredit this subject before the farmers of Ontario.

Mr. Gibson's references to pig clubs are hardly applicable here because, although the age limit for membership to live stock clubs in some cases includes children of eight or ten years old, it is very rare that these young boys take part in such clubs. The school fairs and pig clubs are under the charge of the Department of Agriculture and no one in Ontario runs away with the idea that these institutions are perfect by any means. However, few activities

six, according to our present regulations, but for other subjects the minimum is one. Several schools make provision on the time-table for a class of one, especially in Greek.

The following summary taken from the report of the Minister of Education of 1917 bears out this point:

In Greek:

12	schools	have	a	class	of	1	pupil,
12	"	"	"	"	"	2	pupils,
30	"	"	"	"	"	5	or less.

In Trigonometry:

4 schools have a class of 1 pupil,

9	"	"	2 pupils,
33	"	"	5 or less.

In Mineralogy:

9	"	"	2 pupils,
51	"	"	5 or less.

Summary of the three:

25	"	"	1 pupil,
30	"	"	2 pupils,
114	"	"	5 or less.

The situation indicated in the above table shows that part of our high school education may be very costly. Such schools are not only dissipating their energy but are loading themselves with work that should be done in the university. To introduce agriculture into such schools is not easy because the time of the staff is already occupied. In many cases a teacher is teaching a class of one.

SASKATCHEWAN.

IN the province of Saskatchewan the Department of Education has laid down and adopted a plan for the study of agriculture in the several school grades. The work of each grade is outlined in detail in the curriculum but the following paragraphs indicate the method devised

capacity to enjoy life should be increased through training his powers of observation and developing in him a sympathetic acquaintance with the things of nature. Through the practice work which must necessarily accompany proper instruction in this subject, useful information will be



BUILDING AND GROUNDS OF GRIFFIN CONSOLIDATED SCHOOL S.D. 2488.

for the grouping and arrangement of the various divisions into which nature study and agriculture naturally fall.

The instruction should be such as to bring the life and interests of the school more closely into touch with the home life of the pupil. His

gained, and a respect for farm labour developed. The work should go far to promote the qualities that make for good citizenship, such as consideration for the rights of others and the principle of co-operation in seeking the common good.

The work should be carried into

effect through school gardens, home gardening schemes, experimental and observation plots on the school grounds, children's progress clubs and other practical measures. The spirit in which the work is approached and the method of treatment are of more importance than the subject matter. This is especially true in the lower grades. The attitude of the teacher should show sympathy both with the child and with nature.

The method employed should place the child in contact with natural objects with which he is familiar and lead him to seek his information from them by the use of his senses. The teacher should direct and assist rather than instruct. He should find out what is known and direct to the unnoticed and unknown. He should gather from the pupil the "what" and the "how" of phenomena and lead him to seek the "why," protected at all times, and especially during holidays. A supply of garden tools should be kept under cover and in good repair.

The practical work in the garden should be planned to develop a consistent and progressive series of studies from year to year, and should not be

allowed to become a matter of aimless repetition. Records should be kept of the work done.

The course as outlined for the grades is merely suggestive, and every teacher should feel free to choose that particular part of the work which is most suitable to the environment of the school. The expression of what has been observed may take the form of oral or written composition, drawing, modelling or any other form appropriate to the matter.

Provision should be made in the time-table for a definite amount of practical work at regular intervals in the school garden or experimental plots. The teacher may arrange to have individual plots for the pupils in addition to the experimental and demonstration plots, or he may plan the garden in some such way as a farmer's home garden. In any case the garden should be well kept, to the needs of the community, and to the interest of the pupils.

The necessity for grouping the grades in the one-roomed school has determined the division of the course into four main parts. In graded schools the course may be rearranged to suit the work of the grades.

ALBERTA

BY J. R. TUCK, NORMAL SCHOOL, CAMROSE, ALTA.

INSTRUCTION in agriculture under the Education Department is given in grade XI of the high school, and in the elementary schools in all grades, directly or indirectly, under the names—nature study and agriculture. Only in grades 7 and 8 of the latter, however, does the work bear wholly and directly on agriculture and go by that name. Inasmuch as the work in nature study deals with many of the materials of agriculture studies, it is preparatory to the latter. Steps have been taken to strengthen grade XI work so that it will be, as a scientific study, on a par with the physics and chemistry of that grade. In addition to the work of these grades teachers receive instruction in the

normal schools and may at the summer school obtain an elementary certificate in this work if two seasons' studies are successfully overtaken. Beginning with this year, the lengthened normal school term will permit of more work being taken by teachers-in-training in both the practical and pedagogical phases of this subject.

There are a number of other recent changes and developments which are expected to improve instruction in such subjects as the above. For example; the development of consolidated schools and conveyance of pupils; the provision made for two-room schools in localities which have sufficient children within reach; the erection of teacher's residences in connection with rural schools; the

enlargement of school grounds; the large increase in the number of inspectors. These will provide not only better facilities for such work, but should give added stimulus owing to the larger numbers working together in many cases, to the closer relationship between pupils and resident teachers, to greater continuity in the teacher's work on account of less frequent changing and to more frequent inspection.

The direct inducements offered by the Department are,— grants to the teacher carrying on such work, and to the school board to help in defraying costs of providing facilities and equipment; grants for the improvement of school grounds are also offered and are incentives to the development of the aims in teaching agriculture.

These aims may be grouped under two main heads and noted briefly here: first,— economic; second— educational. The economic phases seek to affect pupils individually and through them the whole people. Through practice in growing things at school and at home, they are to be brought into contact with useful productive activity, and hence obtain material for themselves, the school and the home. They are to be put into such a position that they can undertake to successfully manage plants and soils. The curriculum calls for practical experience with these in garden, laboratory and field. Garden work, in some form, is expected in all grades. The school garden is to be used as an outdoor laboratory and a preparation for work at home,

as well as a place to get products. Indoor laboratory work, is to be carried on by appropriate work with plants and exercises on soil studies. To aid pupils and teachers of grades 7 and 8 the Department has issued a textbook on elementary agriculture, and a bulletin designed to assist in laboratory work in the school room and in the garden. The curriculum in regard to subject matter here, is not intended to be rigid. Chief emphasis is placed on soils and plants but other material, such as animal studies, is added and emphasized according to the interests of the locality.

The pedagogical or educational phases loom up larger, of course, in schools of the Educational Department than in schools of other departments. The work in nature study, and agriculture is designed to be a very important factor in supplying material (concrete and informational) and experiences suitable as bases for practically all the other subjects on the curriculum. Hence it offers important centres for correlation for what seems at first glance, to be a list of study-subjects too great in number and diversity. Obviously activities as those pertaining to food production and the improvement of home environment are of fundamental importance in those respects as well as in promoting the sane development of all pupils.

The attitude of the present educational authorities in Alberta indicates that they are alive to claims for improvement in rural education and we may expect good results from recent and forthcoming legislation.

BRITISH COLUMBIA

BY J. W. GIBSON, M.A., DIRECTOR, ELEMENTARY AGRICULTURAL EDUCATION

GREATER earnestness on the part of teachers and better methods of instruction in nature study and elementary agriculture are becoming more and more evident in the schools of the province. Modern movements in education are

occupying a larger place in the thoughts of our teachers today than ever before. The application of sound pedagogic principles to everyday practice is increasing. The introduction of nature study and school gardening is helping to stimulate

this evolutionary movement in elementary education. The introduction of a new course in nature study in our public schools is also helping to stimulate new interest in elementary education. Year by year teachers are achieving new successes in the correlation of nature study with other school subjects. School and home gardening are being used more intelligently in connection with all branches of school work. The social and moral values growing out of the activities and experiences of teachers and pupils as they work together in investigating and discovering truth

are becoming more and more evident.

This year more than ever before teachers have been heard to say that their pupils are coming to enjoy the nature study part of their work.

In the last analysis the success in this branch, as of other branches of study, rests with the teacher and the teachers of British Columbia not only show improvement in their work but also a growing determination to achieve the highest excellence in their work by becoming more thoroughly trained in it. We look for renewed interest in our special summer courses next year.

NOVA SCOTIA

TRAVELLING TEACHERS' SHORT COURSE.

BY L. A. DEWOLFE, M.S.C., DIRECTOR OF RURAL SCIENCE SCHOOLS

DURING the month of October the travelling rural science teachers were given a nine days short course at Truro to better prepare them for their work. Two of the days were spent at the women's institute convention where occasion was taken to acquaint the members of the institute with the scope and meaning of the rural science instruction given in the public schools. School gardens and exhibitions in relation to school work were freely discussed in addition to addresses and discussions on general school improvement, health problems, community entertainment, and art. Special addresses were delivered on

the dairying industry in so far as it could be introduced into school work. Domestic science presented by the superintendent of women's institutes and others occupied a prominent place in the programme. Evening addresses were devoted to such topics as co-operation between the rural school and the rural church as well as to strictly agricultural topics, discussed by officials of the Nova Scotia Agricultural College. The course was an unqualified success as the travelling teachers gave much and received much which will help in promoting a better school spirit and larger community interests in the respective districts served.

SCHOOL FAIR PROGRAMME

SPRINGHILL, N. S., set a standard last year in school exhibitions which is worthy of emulation. Everything was so well organized that the exhibits were in place and judged before noon. At 1.30 the children were addressed by prominent citizens and outside visitors. From 2 to 3 p.m. they were admitted free to the exhibition, they were then asked to retire to make room for the general public who were charged 10

cents admission. Prize money was easily raised, two canvassers raised \$70 in one hour which helped to make up the revenue secured amounting to \$205.32 a part of which was received from the sale of afternoon tea and a vote of twenty dollars from the school board. After paying all the expenses the school has more than one hundred dollars to be spent on a school library.

NEW BRUNSWICK

SCHOOL POULTRY CLUBS

EARLY in the new year the Director of Elementary Agricultural Education in New Brunswick will ask the public school teachers to form poultry clubs in the schools and determine the number of pupils who are desirous of receiving eggs from the Elementary Agricultural Education Division. This is in accordance with the contract which is to be signed by the pupils and their parents or guardians in connection with the poultry project work and to provide for the boys and girls to enter into an agreement in a business-like way and to take the responsibility of carrying the project to a successful conclusion. The teachers, whether they have taken special courses in the

rural science schools or teachers' winter short courses or not, are asked to form these clubs, also to arrange for the cultivation of home plots among pupils of their schools.

The plots and poultry projects will be visited by officials of the Department of Agriculture during the summer. The pupils will be required to keep records of the dates of setting and hatching, the number of chickens hatched and the number alive at the end of the first month, the average weight of the birds at the end of the tenth week, the kind of feed used the first month, second month, third month, and fourth month, and the cost of the feed up to the end of the tenth week.

QUEBEC

SCHOOL FAIRS IN 1919

BY J. H. LAVOIE, CHIEF OF THE HORTICULTURE DIVISION

ALTHOUGH the school fairs all have the same object, they are essentially a district and therefore a provincial organization. For the proper understanding of the subject it is necessary, therefore, to outline briefly the main lines of the school garden movement in our province.

This movement, which has for its motive the urgent necessity of creating a better liking for the farmer's profession, with a view to check the rural exodus, must reach two classes of pupils: those who attend primary schools of cities and villages, second, those who attend rural schools.

The first are to become tradesmen or manufacturers; it is necessary that they should acquire a liking for manual labour for the things of nature, and that their mind should be tuned in sympathy with the man on the soil.

The second, who might be turned away from the agricultural profession by the attractions of the city, must of necessity receive, from childhood an agricultural education inculcating rural ideas, making the farmer's life attractive to them and encouraging them to acquire elementary notions on agriculture.

As these two classes of pupils live in different surroundings, different means should be employed to attain these results. For both classes, means employed should provide for a large amount of practical work, as natural sciences require an intensive method of education. Therefore in cities or villages where pupils cannot generally grow things at home, owing to the lack of ground and on account of the incompetence of their parents, who cannot guide them in such matters, we must use the school gardens in close proximity to the

school, and where the pupils may grow plants under the direction of the teachers and with the help of agricultural representatives.

On the other hand, in rural localities where all pupils have at home the ground, the fertilizers, the implements and the advices which they require, we recommend home gardens as offering a much wider field for the development of their enterprise and of their faculty of observation.

In our province, where most of the schools in the cities or villages are

necessarily be substituted the home gardens, which at present number 22,734 and cover an area of 29,649,550 square feet.

This makes a total of 31,612,768 square feet or 726 acres for both classes of gardens, under the direction of the 33 agricultural representatives of the provincial Department of Agriculture. The total of young gardeners is 27,326. The total amount granted to them in prizes was \$3,500, in 65 French-Canadian school ing: (1) The apportioning of grants



WINNERS AT THE SCHOOL FAIR COMPETITION, VALLEYFIELD, QUE.

managed by brothers or sisters of religious orders, who can supervise, during the summer vacations, the work done by the pupils in the school garden, no more efficient means of education could be found than that of school gardens. There are actually 374 school gardens in the province, worked by 8,142 pupils and covering a total area of 1,963,210 square feet (year 1918-19).

In the country where the rural schools are generally under the care of teachers who go away during the summer, to the school gardens must

between the schools of one district. (2) The methods of entry and the classification of the products. (3) The awarding of premiums.

It would be impossible, owing to the lack of space, to reproduce all the regulations included under the above. Their main object is to encourage competition by advertising and rewarding the merit of the winners. Attention should be called however to the following: the variety in the products exhibited, the im-fairs. To these pupils the horticultural branch distributes every

spring over 200,000 packages and bags of seed grain.

The organization of these fairs is left to the discretion of the agricultural representatives. They may be local or district fairs, according to whether they include the schools of one or of several parishes. They are governed by uniform regulations established by the Department and the application of which is supervised by the agricultural representatives. Such regulations bear on the follow-

poultry raising, apiculture, canning, domestic science, cooking, art, rabbit, pig, calf, sheep raising, etc.

Among the classes that have been specially useful this year, the pig and calf raising competitions, organized among the pupils by the agricultural representatives with the help of the bankers, deserve special mention. Mention should also be made of the large number of miniature models of instruments used in agriculture, of collections of weeds and



INSTRUCTIVE EXHIBITS OF FIELD PRODUCTS, CHILDREN'S COOKING, NATURE STUDY COLLECTIONS, ETC., AT A QUEBEC SCHOOL FAIR.

provement noted from year to year in the quality of these products, the information gained by the pupils and their parents, the interest which they take in these fairs and the conclusions that are drawn from them.

Although the products to be exhibited are classed into 17 classes subdivided into 102 sections, there is hardly any school fair in this province where all the prizes for all these classes are not competed for. Gardening itself includes 14 sections, field crops 18, collections, 6, and so on for fruit growing, floriculture,

insects mounted and named by the pupils themselves under the direction of the agricultural representative and the teacher.

All the reports of the judges sent by the department to the various school fairs to help the agricultural representatives, agree in stating that quality of the products has improved. Some reports even go as far as to say that the products presented at some of those fairs were of a better quality than those presented at the fairs of the horticultural or agricultural associations. One of the chief im-

provements noted is in the care given by the pupils to the selection of their products.

In quite a few fairs, grain of a pure quality could be seen and this grain was selected with such a care as to give hope that in the near future agriculture will be completely transformed in some parts of the province.

Such results cannot fail to stimulate the interest of the parents, and the children are not the only ones to profit from the teachings of the agricultural representatives, when the latter inspect the gardens or from the advices given by the judges at the fairs.

It is not suprising therefore if parents have, in various parts, abandoned their old methods of culture and varieties of seed grain to adopt those with which their children have obtained such magnificent results. Such facts should convince us that the school garden movement is not only a powerful factor in agricultural training for our rural youths, but that it will also be the means of changing a new mentality in adult farmers who could not, by any other means, be made to abandon their routine.

ONTARIO

RURAL SCHOOL FAIRS, 1919

By R. S. DUNCAN, B.S.A., Supervisor Agricultural Representatives.

DURING the past year the Ontario Department of Agriculture through its agricultural representatives distributed to 78,946 pupils in 3,278 rural schools of the province the following quantities of seeds:—

POTATOES:—	1,890 bus.
GRAIN:—	
Oats, barley, wheat,	
peas, corn.....	432 bus.
ROOTS:—	
Mangels, turnips.....	12,575 packages.
VEGETABLES:—	
Beets, carrots, onions,	
parsnips,.....	30,700 “
FLOWERS:—	
Asters, phlox, sweet	
Peas, cosmos.....	21,900 “

The potatoes were distributed in 5 lb. packages; the grains in 1 lb. packages with the exception of corn, when about 2 ozs. were given out; the roots and vegetables were done up in packages sufficient to plant a plot 10' x 18' in size. These seeds were to be planted in small plots on the home place according to instructions which accompanied each package. Some idea can be gotten as to the size and arrangement of the plots

from the instructions issued in regard to potatoes:—

INSTRUCTIONS.—

1. Measure a plot 120 x 210 inches. Drive stakes at the four corners and place a cord tightly around the outside of the stakes.
2. Mark out 4 rows 30 inches apart and make furrows with a hoe about 4 inches deep for each row, allowing 15 inches between the outside rows and the cord.
3. Cut the potatoes into 56 sets, with one or more strong eyes in each piece.
4. Plant 14 sets in each row, leaving the sets 15 inches apart in the row, and planting the end pieces 7½ inches from the cord.
5. Cover the sets with a hoe to a depth of about 4 inches.
6. Gather the beetles in a pail or kill them on the vines by spraying with Paris Green or Arsenate of Lead.
7. If possible spray the vines with Bordeaux Mixture to prevent blight and rot, using the proportion of 1 lb. blue stone, 1 lb. fresh lime and 10 gals. of water. By first applying this mixture when the vines are 6 or 8 inches high, and then repeating the process every two weeks until about September 1st, the blight will be prevented largely. One-quarter pound of Paris Green may be added to the 10 gallons of Bordeaux Mixture, and the two remedies would thus be applied together.—
8. Keep the soil loose at all times in order to destroy weeds and to conserve soil moisture. Gradually rake up a little earth around the plants to prevent sunburn of the potatoes.

9. Dig the crop when ripe and separate the marketable from the unmarketable potatoes, finding the weight of each.

10. Save the choice potatoes for seed another year, and select a peck of the best for the Fair, these being clean and smooth and all of uniform size and shape. The large, rough potatoes seldom win a prize.

In following these instructions the pupils work out practical exercises in farm arithmetic. It teaches them to be careful and exact. It is true that some pupils disregard the regulations and some of the seeds are planted in long rows in the field beside the main crop belonging to "Dad". They then receive the same treatment as to cultivation and care as "Dad" gives his crop and the boy or girl loses a certain amount of interest in not caring for it himself. The identity is gone. This has been more noticeable where the plots have not been inspected and scored for "the best kept plot." Invariably, however, the most interested pupil is found where the plot is located in the garden or some place where it is carefully protected by a fence and where the instructions have been carried out to the very letter.

EGGS FOR HATCHING.

All told 11,045 dozens of eggs of a bred-to-lay strain of Barred Plymouth Rocks were distributed last spring. This would be an average of approximately 4 settings to each of the 3,278 schools in the School Fair movement. Practically all these eggs were secured from what are termed Poultry Breeding Stations which have been established in nearly every county and district of the Province. A contract of Agreement is drawn up with the owner of the Poultry Breeding Stations which should be somewhat of a safe-guard as to the quality of the eggs distributed.

Reports which have come to hand would indicate that the fairs have not lost any of their old time enthusiasm. The pupils are beginning to realize that what they are doing is being appreciated by the citizenship

of the community and this naturally spurs them on to greater efforts.

EDUCATION CHIEF FEATURE.

Where possible arrangements were made to secure the services of outside judges with the exception of lady judges for the girls sewing and baking classes. Even in this, excellent satisfaction was given as the majority of fairs have the blind system of entry tickets and the pupils are known by numbers. After the judging is finished, the envelopes are torn open and the names of the prize winners are revealed. The Department of Agriculture supplies entry tickets, prize stickers, prize ribbons and officers badges but all prize money is contributed locally through the Trustee Boards of the various school sections, township councils, and by public spirited persons. The prizes are not large and purposely so. The outstanding feature is education; not the amount of prize money. Prizes are simply the means, while the end is in the interest that is aroused and the thought that is stimulated.

In live stock, special classes are open for colts of the heavy draft type, colts of the roadster or carriage type and a special class for the best trained or halter broken colt. The latter prize is for the boy's skill in handling a colt though the quality and conformation of the animal counts a small percentage. Instances are known where boys spend practically all their spare time in training their colts and their calves as well, to lead, back, lift their feet and do various stunts. The best colt in the draft and roadster classes may, therefore, not necessarily win the prize for the best halter broken colt. The idea behind this is to develop the boy's character and to interest the boy in the care and feeling of live-stock.

Prizes are also given for the best beef heifer calf, pure bred or grade, and for the best dairy heifer calf, pure bred or grade. Where the

class is not restricted to heifer calves, a clause is usually inserted which bars grade bull calves.

Spring lambs are usually classified as long wool and short wool breeds and the class for pigs is invariably restricted to a pair of bacon hogs.

In addition to these classes the Canadian Bankers' Association offer special prizes with certain restrictions for calves and pigs.

Poultry are brought to the fair in any kind of box or coop and exhibited in special collapsible steel poultry coops provided by the Department. Prizes are given for the best cockerel, best pullet and best trio-cockerel and two pullets,—provision being made on the prize list for this rule "separate birds are required for each entry." This calls for a greater display of birds and gives more pupils an opportunity of winning a prize. The judging is done from a utility standpoint, the prize being given to the pupils whose birds show the best growth and development. With the exception of chickens hatched late in the season most of the birds were well brown and of good quality.

SOIL PRODUCTS.

In regard to soil products, while the exhibits were numerous the quality in some instances was not of the best. This was not altogether the fault of the exhibitor but for some crops it can be attributed to the poor season. Some of the pupils are getting the type of potatoes and vegetables firmly fixed in their minds—profiting from past experiences—but others seem to have an idea, that the largest carrot and beet should win the prize. All vegetables are judged more from the housewife's standpoint, quality, uniformity and freedom from disease. Pupils would do well to consult their mothers when selecting their vegetables for exhibition.

The potato classes are confined to the Green Mountain and Irish Cobbler types. In the grain sections some

splendid sheaves of oats, barley, and wheat were shown. The cleaned grain from the plots was usually shown in quart jars and was of A1 quality. A great many farmers will get a start in good seed of the best varieties by buying the product of the "boy's farm". In the fruit districts of the province, the apple sections of the prize list were well filled and the quality was good. The displays at some fairs would put to shame the exhibits of fruit at the larger so-called "fall fairs." The flowers are a decorative feature and some exceedingly choice bouquets of asters, sweet peas, phlox, drummondii and mixed bouquets from the home garden were exhibited. This feature is confined to the girls and they have become quite adept in arranging attractive bouquets.

WEED COLLECTIONS.

The nature collections of weeds, wild flowers, insects—beneficial and injurious—weed seeds and the work of plant diseases and insects have not in the past been as numerous as we would like to see, though on the whole the pupils deserve to be complimented for the excellent collections form the basis for some splendid lessons in nature study and agriculture in the school. While it is desirable to know how to mount a specimen neatly and in the proper prepared. These collections should manner it is infinitely more desirable that the pupil know the name and character of the specimen whether it be a weed, weed seed or insect and know whether it is injurious and how best it can be combatted.

MANUEL TRAINING.

Some interesting and excellent specimens were exhibited in the manual training classes, such for instance as milk stools, chicken coops, bird houses, hammer handles, feeding hoppers, nail boxes, models of hay-racks and ladders and specimens of work with jackknives. The boys take great interest in such work which they

can do with saw, hammer and nails and pride themselves in their own handicraft.

Special classes have been provided for the girls under the term "Household Science". These include baking, canning, sewing, etc. Pupils competing in these classes had to attach a certificate to the entry tag stating that the work was done by the pupil. This certificate very largely overcame criticisms formerly made.

Writing, drawing, essays, maps and plans of home farms, all had their place at the fairs. At one fair an agricultural examination for boys and girls in or above the junior third class was introduced. Questions were prepared and sent to the schools before the summer holidays.

Along with the examination questions a number of bulletins were sent to each school to be kept in the library and to be used as a reference in looking up answers to questions submitted. The examination was held at each school prior to the Fair under the supervision of the teacher and the papers were marked by the judge. Reports would indicate that it is an excellent way of giving the pupils an opportunity of getting definite information on certain agricultural subjects.

SPECIAL CONTESTS.

Contests, in which the boys and girls enter keenly, are always an important feature on school fair day. The school parade is very attractive and inspiring. Some of the objects are merely to stir up a friendly rivalry and to show the public the number of pupils interested in the school fair movement. At a number of fairs a special place on the

programme is given over to an exhibition of physical drill under the Strathcona Trust Fund. The exercises and drills are done very gracefully and are particularly pleasing to the spectators. This develops gracefulness and proper carriage in the pupils. Other competitive features are live stock judging for teams of three boys from each school; apple and weed naming; chicken plucking; darning and mending; solo singing; public speaking and driving and riding contests which are all keenly contested by both boys and girls.

The first school fair was organized in 1909 with three schools taking part. Ten years later 357 rural school fairs were held in the province and the pupils had 69,848 home plots and made entries to the number of 111,823. It is estimated that perhaps 250 people saw the first school fair in which some 58 pupils took part, whereas this past fall 92,600 children and 107,590 adults attended the fairs in the province. This is truly a wonderful growth.

The most unfortunate thing about school fair work is that more time could not be spent teaching lessons from the exhibits and competitions. Too much is crowded into one day. At many fairs, however, opportunity is given the judges to explain the reasons why a certain exhibit was placed over another. The desirable type in vegetables and what constitutes quality are explained in order that the pupils may have a better conception of the standard by which such exhibits are judged. Hints or suggestions are given in the preparation of exhibits and these talks are decidedly educational in value.

COUNTY PRODUCT MAP

BY R. A. FINN, B.S.A., AGRICULTURAL REPRESENTATIVE, MIDDLESEX, CO.

WE endeavour to have all our work in connection with school fairs of the greatest educational and practical value,

therefore, all competitions that are held are of such a nature that the pupil, in preparing for them, is acquiring useful information. In

such contests as weed naming it is necessary for the pupil to become acquainted with the common weeds of his neighbourhood, if he intends to compete successfully. In stock judging it is necessary that the competitor knows the points and is able to give reasons to support his placings.

One competition which we conducted for the first time this year and which attracted considerable attention was that of the "Product Map." This was a school competition in which each school could exhibit one map.

The educational feature of the contest was: It was necessary to learn the products of Middlesex, then to ascertain in what sections of the county these products represented the chief industry. Then it was necessary to place on the map the various representations of these products. This was done in various ways: Representing the product by writing its name on the proper section of the map; cutting pictures from farm magazines and pasting on the map in the correct location; drawing on the map pictures of the products; or by attaching the real product where possible; or by miniature representations, that is, in the case of cereal crops a few grains

of wheat, barley, etc., being used, in the case of live stock small models in wood or plasticine serving the purpose. In a section in which a cheese factory was situated the product was represented by a small piece of cheese similarly, a tiny sack of flour showed the location of a grist or flour mill.

Thus, it is obvious that the resourceful teacher could have all pupils assist in the preparation of the map. The smaller pupils could be engaged in paper cutting and moulding animals while the more difficult work of collecting and selecting material and the drawings could be looked after by the older ones.

In other words, we have in the Product Map a medium for teaching a correlation of such subjects as agriculture, geography, manual training, drawing, and language.

The schedule used in judging this year was as follows:

- (1) *Utility*—30—By this we mean that the completed map shall be capable of being used as a map under varying conditions; that is, lettering distinct and clear cut, may be rolled up.
- (2) *Accuracy*—20—True to scale; townships clear cut, lettering neat.
Product Map.
- (3) *Location of Products for each Area*—35—each product must be located properly.
- (4) *General Appearance*—15—Neatness of material selected, method of attaching articles, cleanliness.

SASKATCHEWAN

THE SCHOOL EXHIBITIONS

BY FRED W. BATES, B.A., M.SC., DIRECTOR OF RURAL EDUCATION ASSOCIATIONS AND SCHOOL EXHIBITIONS

THE School Exhibition movement in Saskatchewan has just closed its most successful season. In 1909 the Carrot River School Garden Association organized and carried to a satisfactory issue, the first school exhibition held in the province. During the following five years the outward development was slow, but much discussion and investigation took place resulting in a better understanding of the work.

The development of similar activities elsewhere also helped in arousing public interest.

In 1915 the present era of rapid progress began. Early in that year the Agricultural Instruction Committee, after much discussion recommended that the school exhibition be directed and controlled by the Department of Education. It was further decided that an exhibit of school work shown at an agricultural society

fall fair should not be classed as a school exhibition excepting where a special programme of school work was arranged and a special day set apart for the work. Each season a large number of agricultural societies do excellent work in providing an opportunity for children to exhibit at the regular summer and fall fairs but such are not included in the following table which shows the development since 1914 of the school exhibition movement.

Year.	Number of exhibitions reported.
1914.....	14
1915.....	42
1916.....	84
1917.....	129
1918.....	175
1919.....	202

Of the 202 exhibitions reported, above, five were non-competitive exhibitions of school work. These consisted of prize winning exhibits from the local exhibitions of the school inspectorate and were held during the teachers conventions.

INCREASED INTEREST SHOWN.

The outstanding characteristic of the year's work has been the increased interest shown alike by general public, teachers and pupils. Not only have the exhibitions been well attended, but there has also been a marked development in the public appreciation of the whole enterprise. Trustees are beginning to see the importance of the movement and it is becoming much easier to obtain general assistance in carrying on the work. The sympathetic attitude of the public is indicated by a summary of the reports received to date, which shows a total attendance of 9,000 people at 32 local exhibitions where 4,000 pupils from 160 schools made over 15,000 exhibits. The school exhibition has already become in many centres the most important event of the year.

The success and increasing popularity of the movement in Saskatchewan is due in no small degree to certain well defined ideas which from the beginning have characterized the work. The school exhibition is a definite and deliberate attempt to present for public appreciation the whole range of school work, together with certain other activities which have to do with the betterment of the whole community. Herein it differs from the usual school fair in which the dominant ideal is improved agriculture and home life by means of vocational projects for boys and girls.

A BROAD PROGRAMME.

The school exhibition programme is therefore, very broad. In this province where the value of education through agriculture is being more emphasized and better understood, school and home garden work is given an important place while agricultural projects such as poultry raising are not neglected. Household science and manual training are subjects of study in our schools and, therefore, receive a large share of attention but the competitions are not always confined to class room activities. Practically every exhibition has sections for drawing, composition, writing and geography while work in such subjects as arithmetic, history and grammar is becoming more common. Public speaking, music, sports and play, round out the exhibition programme which thus represents every side of school activity, and the school takes its true place as the centre of community interest.

The endeavour to make the exhibition a true expression of the school and its activities has led to certain very definite results. In the early stages, inadequate organization and hasty preparations all too frequently characterize the enterprise. A few days immediately before the exhibition were given over to the preparation of exhibits and the real work of the school neglected. The home garden and farm yard in some

cases were drawn on for exhibit purposes. This kind of thing rapidly disappeared, however, as the true purpose of the work became apparent. The public now demands that the material shown be the work or property of the person exhibiting and each year brings a more determined effort to have the programme arranged as early as possible. Already a large number of organizations have completed preparation for 1920 and in several instances the programme is printed and already in the hands of the teachers.

NEEDS BETTER UNDERSTAND.

A better understanding of the actual work of the school is another important development. Not only teachers and trustees, but also prominent ratepayers have been hard at work studying the programme of school studies in order to devise competitions that will give the children adequate opportunity to show their attainments. In viewing the work the general public has been led to question the meaning of certain lines of activity and to investigate modern development in school life. A prominent member of one of our normal schools recently stated that in his belief the school exhibition had done more toward the bringing about of the "better school" than any other agency at work.

As noted above, reports are far from being complete and statements regarding the work of the year are of necessity only approximate. In general the live stock and poultry exhibits have been better than during previous years. Stock judging competitions are on the increase and are proving of great value and interest. The organized club work consisting of certain vocational projects is directed from the Extension Department of the College of Agriculture. Although not a school activity, the majority of the club members are in attendance at school and as the work is considered an im-

portant supplement to the school activities, it is usually organized in close co-operation with the school exhibition. Very satisfactory development has taken place in this department as shown by the report of the Director, Mr. Rayner.

The soil products exhibited this year have not been up to the mark of previous years. A very large section of the province suffered from lack of rain especially in the early part of the season resulting in almost total failure of garden projects. Potatoes were the only soil product in evidence at many centres. In the nature study sections many noteworthy efforts were made. Weed and weed seed collections have improved in character; insect collections were in some cases quite remarkable; while general collections such as pressed flowers, woods, grasses and bird, weather and flower charts were somewhat above the average of previous years.

CLASS ROOM WORK.

In the class room work, there was a distinct improvement along the lines already suggested. Freak and unrelated types of work are being eliminated and the regular school work is being shown. The household science and manual training exhibits showed that real work was being accomplished in these subjects.

The greatest development, however, has been in the special contests. For the first time practically every centre held contests in singing and public speaking. Spelling contests both written and oral are very popular while physical training and sports are on every programme. Play, music and oral composition, three phases of school activity which in the past have been neglected, are thus being emphasized as never before and public interest aroused. At the next provincial convention, the Trustees' Association of Saskatchewan are providing shields and medals for chorus singing and public speaking.

LOCAL SUPPORT GIVEN.

The popularity of this movement in Saskatchewan is clearly shown by the fact that the work is supported locally. There is no government aid provided in the form of grants or donations. Every possible assistance, however, is rendered by supplying judges and speakers. For the coming year it is planned to have the exhibition arranged in circuits throughout the whole province and at least three outside judges provided for every centre who with the school inspector of the district would give balance and expert direction to the work.

The Rural Education Association has proven the most satisfactory organization for carrying on this work. There are 120 Rural Educa-

tion Associations in Saskatchewan, 105 of which conducted successful school exhibitions. In several inspectorates the whole territory is organized into such associations and a common prize list used. In a number of inspectorates a central exhibition is held at which the prize winning exhibits from the locals are shown.

As stated in the beginning, the school exhibition movement has just closed its most successful season. Modified to meet our own conditions it has developed into a strong educational force and commands the support and co-operation of the whole community. The prospects for 1920 are most encouraging and a more successful season than this has been is confidently anticipated.

SPECIAL COMPETITION FOR BOYS' AND GIRLS' AT PROVINCIAL SEED FAIR

ANY boy or girl between 12 and 18 years of age living in Saskatchewan is entitled to compete for special prizes offered for seed exhibits at the provincial seed fair. The rules governing the competition are as follows. 1st, The exhibit shall consist of a compact sheaf of wheat or oats approximately six inches in diameter, hand selected from a standing crop, and in addition a gallon of threshed grain from the same

field or plot. 2nd, A card must be attached to each exhibit giving the name, address, and age of the exhibitor as well as naming the variety of grain. 3rd, In placing the awards the judge will consider (a) type, uniformity, and character of head, (b) character of straw, (c) quality of grain in head, (d) quality and uniformity of grain in the sample. 4th, All exhibits at the close of the fair will be returned to the various exhibitors.

ALBERTA

THE EDMONTON EXHIBITION ASSOCIATION

REALIZING the need of stimulating enthusiasm for increased production and winter feeding the Department of Agriculture for the Dominion of Canada will offer at the coming Edmonton Spring Live Stock Show special prizes for fat stock including the following;—\$1,100 in six prizes for a class calling for fifteen steers, the 1st prize being \$350 and \$860 in two classes calling for five steers (one over and one under 1,100 lbs.) in each of which six prizes are offered commencing with \$100 as a first prize. There will be similar classes for finished sheep and swine, and dressed carcasses of sheep, hogs, and poultry.

The calf feeding competition for children will be much the same as that held last year. Prizes amounting to over \$1,700 will be offered in the beef and dairy sections, and each child who does not win a premium

gets a consolation prize of \$5.00.

A new pig feeding competition for children will be tried out for the first time at the coming Spring Show. There will be three classes, \$350 will be offered in ten prizes in a class calling for the best two bacon hogs and \$195 is offered in each of two classes with eight prizes each for the best bacon sow and best medium thick sow farrowed in 1919.

The Edmonton Spring Live Stock Show will be held March 29th to April 2nd, 1920 and preparations for this event should be started immediately in order that animals will be in the best possible condition for the show ring. In addition to the special prizes above mentioned the Association will offer the customary prizes for fat stock. By this means it is hoped that the standard in production and quality will be encouraged in the cattle section of Alberta.

PART IV

Special Contributions, Report of Agricultural Organizations, Publications, and Notes

LIVE STOCK YARDS AND EXCHANGES.

THE Live Stock Market is composed of several separate and distinct businesses working together in the interests of producers and consumers. These businesses include dealers, commission agents, order buyers, and government officials, who transact their business at the Stock Yards in accordance with the rules and regulations governing Live Stock Exchanges. The Stock Yard is a semi-public institution operated as a public market, and its business is the warehousing of live stock. Its one great advantage is that it provides a medium where the men with live stock to sell find buyers, and buyers find live stock.

The Stock Yard Companies themselves are not financially interested in the price of live stock but they endeavour to keep prices in line with other markets both to invite shipments and to invite buyers. It is to the advantage of all that the market be kept uniform in order to prevent fluctuations; in case of very low markets the live stock is shipped to the high market and in case of too high a market the outside buyer goes to the lower market.

When cattle are unloaded they go over the Live Stock Yards' scales for both their buying and selling weights. These scales are operated by the company whose interest in the weights of animals is neutral, owing to the fact that it has no financial interest in the transaction. The revenue of the Yards is derived from the handling charges and from profit on feed. These charges are under the control of the Dominion Government which

also controls the operations of the Yards to a great extent.

The Dominion government maintains two officials at the Live Stock Yards, one from the Health of Animals Branch to look after sanitary conditions and quarantine regulations; the other, representing the Dominion Live Stock Commissioner, advises prospective purchasers as to conditions and prices.

The Live Stock Exchange operating on all markets sets the rules for the conduct of business among the commission agents and dealers. Its objects are to establish and maintain commercial exchange for the benefit and furtherance of all interests directly connected with the buying and selling of live stock; to promote and establish uniformity in the customs and usages of the live stock trade; to provide for speedy adjustments of business disputes between its members; to secure to its members the benefit of co-operation for the furtherance of their legitimate pursuits; to arrange for social intercourse among members of the Exchange, and to enact rules, regulations, and by-laws for the purpose of carrying out these objects.

The government of the Exchange is vested in a Board of Directors composed of a president, vice-president, and five other members. These, with the secretary-treasurer and Committee of Arbitration consisting of three members, are elected for terms of one year. The rules and regulations contain numerous stipulations regarding the conduct of members of the Exchange and the duties of the various

Boards with regard to investigations. The object is to promote honest dealings and punish those who violate business contracts or obligations. So far disputes and disagreements have been very rare. Transactions running into thousands of dollars being made without misunderstandings.

In August, 1918, all Live Stock Yards and Exchanges came under the control of the Federal Minister of Agriculture through the Live Stock and Live Stock Products Act—which regulates Stock Yards much as the Railway Board regulates the Transportation Companies,—sets the rates

and fees, prices charged for feed, etc., and inspects equipment for handling stock. It also specifies that all records be kept open for public inspection. This Act regulates and controls the entire Live Stock marketing business done in the Stock Yards and is so framed as to protect the interests of the breeder and feeder. The relationship of the Department of Agriculture to the Yards and Exchanges is shown in Part I of this issue, in contributions from the Live Stock and The Health of Animals Branches.

LIVE STOCK YARDS

EAST END CATTLE MARKET, MONTREAL

BY P. F. GOW, AGENT

THE Canadian Pacific Railway Company owns the East End Cattle Market which is located at the corner of Mount Royal avenue and Iberville street at the northeast end of Montreal city. The area covered includes twenty-five acres of land with fifteen acres of pens. The C. P. R. has direct connections and switching arrangements from the G. T. and C. N. railways. Abattoir accommodation is with the Montreal Abattoir Company adjoining the stockyards. In all there are forty-four loading and unloading chutes, four cattle corrals, eighty cattle pens, fifty hog pens, seventy-five sheep pens and twenty-five calf pens. The capacity of the yards is 3,000 cattle, 5,000 sheep, 1,000 calves, 2,000 hogs and 100 horses. There are three weigh scales on the premises. Throughout the yards the floor is concrete with the exception of thirty-two cinder chutes.

The firms doing business at this yard include ten commission men, thirty speculators and five abattoir agents. The company does not hold space for various dealers with the exception of part of a bull barn, cow stable and horse stable which are leased. All others are allocated to patrons as they are required—first come first served—. Hay and feed is on hand at all times for the animals passing through the yards and there are thirty-two pens provided with a full staff at the disposal of the patrons for feeding and loading animals, etc. The city by-laws and rules of the Montreal Live Stock Exchange govern operations of the yards together with the regulations of the Government Live Stock and Live Stock Products Act.

The receipts of live stock for the past five years are as follows:

Year.	Cattle.	Hogs.	Sheep.	Calves.	Horses.
1915.....	65,187	75,094	65,894	43,707	37,365
1916.....	60,427	62,436	54,216	41,000	24,503
1917.....	66,760	53,443	59,810	46,036	35,426
1918.....	68,444	54,385	66,340	45,563	13,347
1919 to Sept. 30.....	43,831	44,900	34,926	46,754	5,074

THE MONTREAL STOCK YARDS

BY D. J. TANSEY, SECRETARY-TREASURER AND MANAGER

THE Montreal Stock Yards Company was incorporated in the year 1885. At that time and for some years following, Montreal was the principal live stock market in the Dominion by reason of its being situated at the head of ocean navigation when there was a heavy export trade of live cattle to Europe. This trade through various reasons became extinct, and Canada had to rely on her home markets. The company then proceeded to build a market to conform with the changed conditions, and succeeded in getting the Laing Packing and Provision Company (now the Canadian Packing Company) to locate a packing establishment adjoining our yards. The Wm. Davies Company followed shortly after with another plant and the Stock Yards Company built a public abattoir to look after the local butchers. These slaughter houses have been added to until to-day their capacity doubles that of the original plants.

Our property covers about 25 acres and is situated at Point St. Charles

with the Lachine Canal on one side and the river St. Lawrence on the other, conveniently located to take care of the trade coming to Montreal by water. Our rail facilities are of the best, being able through switching accommodation to receive stock from all the railroads operating in Canada.

The ownership is a private enterprise with a capital of \$350,000. Mr. W. B. Strachan is President, J. E. Dalrymple, vice-president, D. J. Tansey, secretary-treasurer and manager.

The accommodation for live stock is very complete, the entire yards are under cover with alley-ways either concreted or bricked. Four cattle stables house 800 head, horse barns containing 400 stalls, two double-decked market buildings where the stock is placed on sale, various scales and other appointments.

An exchange building with offices, etc., for the commission men was erected two years ago, and this year the company expended \$15,000 on improvement and additions to the yards.

UNION STOCK YARDS, TORONTO

BY F. FLETCHER, GENERAL MANAGER

THE Union Stock Yards located on Keele street and St. Clair avenue in the city of Toronto are owned by a stock company with an authorized capital of \$1,500,000. The holdings comprise 115 acres, 32 acres of which are covered with pens, buildings, etc. The Canadian Pacific, Canadian Northern, and Grand Trunk Railway Companies have direct connections with the yards and there are sixty-five loading and unloading chutes in operation.

The following abattoirs are located adjacent to the stock yards: Harris Abattoir Company, Gunns Limited, Swift Canadian Company, Davies Company and the Canadian Packing Company. The Puddy Brothers are located in Toronto and buy a large

portion of their supplies which are driven or shipped to them. There are in addition a large number of smaller butchers who make their purchases at the yards.

The capacity of the yards is 8,000 cattle, 6,000 sheep, 7,500 hogs and 250 horses. There are 8 cattle corals, 996 cattle pens, 912 hog pens, 164 sheep pens, and the yards are equipped with six weigh scales. The floor consists of brick or concrete pavement.

Definite space is allotted to different commission firms and dealers and the Stock Yard Company performs the work of feeding the animals and supplies all the feed furnished. There are thirteen commission men, twelve speculators, and about fifty abattoir buyers dealing on these yards.

The receipts for the past five years are as follows:—

Year.	Cattle.	Hogs.	Sheep.	Horses.	Calves.
1915.....	306,873	423,976	189,673	124,647	41,829
1916.....	319,233	496,723	175,921	93,690	51,171
1917.....	339,874	544,941	180,121	78,930	51,815
1918.....	368,078	488,555	185,951	37,036	62,177
1919 to Sept. 30.....	261,718	430,302	131,709	22,890	63,266

UNION STOCK YARDS, ST. BONIFACE

BY A. M. LAMBERT, SUPERINTENDENT

THE Union Stock Yards, owned and operated by the Public Markets, Limited, with an authorized capital of \$1,250,000, are located in the city of St. Boniface about three miles from Winnipeg. The company holds two hundred acres

The stock yards are equipped with seventy-seven loading and unloading chutes, ten cattle corrals, seven hundred and fifty cattle pens, one hundred and thirty hog pens and eighty sheep pens. The capacity is approximately 10,000 cattle, 6,000



ST. BONIFACE STOCK YARDS

about fifty of which are now occupied with pens, loading and unloading platforms, trackage and buildings. There are five weigh scales in use. The flooring in the yards, pens and alleys is of concrete. These yards are served by three railroads, Canadian Pacific, Canadian Northern and Grand Trunk Pacific. The local abattoirs buying through these yards have a capacity of approximately 5,000 cattle, 9,500 hogs and 2,000 sheep per week.

hogs and 4,000 sheep. The horses are taken care of in cattle pens.

There are ten commission firms and about twenty-five speculators, besides buyers from four large local packing houses, and occasionally agents from Eastern packing houses, doing business here. Each commission firm has certain alleys both in hog and cattle pens, allotted to them. Through shipments, when billed in care of any one of the firms doing

business here, are fed and cared for by the company. This company is incorporated under Chapter 45 of

Manitoba Statutes 1911.

Our receipts for the past five years are as follows:—

Year.	Cattle.	Hogs.	Sheep.	Horses.
1915.....	138,534	484,997	13,801	6,214
1916.....	158,949	317,821	20,590	10,761
1917.....	286,651	372,168	23,575	13,574
1918.....	320,207	362,675	38,762	7,951
1919 to Sept. 30.....	134,943	212,936	11,100	3,682

SASKATCHEWAN LIVE STOCK YARDS

LIVE Stock Yards are now in operation at two centers in Saskatchewan. They are both newly constructed and, as yet, no complete report regarding their activities is available. The first general meeting of the Southern Saskatchewan Co-operative Stock Yards Company, Ltd., was held at Moose Jaw last June. At that time tenders were let for the construction of these Yards which are now completed and ready for business. At Prince Albert Live Stock Yards are also completed and at both these

places the charges have been approved by the government and business is progressing satisfactorily.

Although the Saskatchewan government is financially interested in both of these Yards definite arrangements have been made whereby the Live Stock and Live Stock Products Act will govern. Rules, regulations, and by-laws similar to those governing other Stock Yards throughout the Dominion have been adopted and it is expected that progress will shortly be reported at both places.

THE EDMONTON STOCK YARDS

BY J. H. ASHCRAFT, MANAGER

THE Edmonton Stock Yards owned and operated by an Alberta corporation with an authorized capital of \$250,000 is located between 52nd street and 127th avenue, Edmonton, Alberta. The yards cover an area of thirty-one acres of land, eight acres of which are occupied with buildings and other facilities including pens, platforms, trackage, storage space, et cetera. There are two weigh scales in operation. The railroad facilities are direct connections with the G.T.P. and C.N.R. and switching connections from the C.P.R. on to the C.N.R. and from the E.D. and B.C. over the G.T.P. lines. There are ten loading and unloading chutes on each of the

railways G.T.P. and C.N.R., making a total of twenty.

In all there are three cattle corrals in connection with these yards as well as one hundred and sixty-seven cattle pens. There are fifty-three auxiliary hog and sheep pens as well. The capacity for cattle, sheep, hogs and horses is 2,500 cattle, 1,000 hogs, 1,000 sheep and 500 horses. The regular cattle pens are floored with brick while the overflow pens have simply earth floors. The hog and sheep pens are floored with brick and all the alleys have brick floors.

The abattoir accommodation in connection with these yards consists of three government packing houses in Edmonton and also two non-

government abattoirs. There are four commission firms doing business at these yards as well as nine dealers or speculators. The space is allotted to commission firms with the understanding that pens will not be held for one firm to another firm's disadvantage, that is, one firm is not permitted to hold pens empty if another firm needs the room. Hay and grain

is kept on hand by the Stock Yards Company and is distributed by them as fed.

Our company has no operating by-laws. We have been governed by the Live Stock and Live Stock Products Act since August 20th, 1918. Our receipts since we began doing business are as follows:

—	Cattle.	Calves.	Hogs.	Sheep.	Horses.
3 months 1916.....	8,416	644	4,215	1,370	30
1917.....	31,719	5,149	25,643	3,783	380
1918.....	45,456	5,689	44,562	5,076	3,677
9 months 1919.....	38,564	5,029	22,646	13,328	6,806

THE ALBERTA STOCK YARDS CALGARY

BY EDWARD JONES, MANAGER

THE Alberta Stock Yards, located at Calgary, owned by the Alberta Stock Yards Company, Limited, with an authorized capital of \$750,000 has an area of approximately twenty-nine acres of land. All cars are switched over the Canadian Pacific, Canadian Northern and Grand Trunk Pacific railways by an engine owned by the company. The equipment of the yards includes 29 loading and unloading chutes, 5 cattle corrals, 247 cattle pens, 79 hog pens, and 30 sheep pens besides 44 catchpens for cattle and 14 catch pens for hogs. The capacity of the yard is 5,000 cattle, 2,000 hogs, 2,000 sheep and 600 horses and there are four weigh scales in use. All open pens are, or will be, floored with concrete. All covered pens have cinders or earth floors and alleys which are not now concreted will be floored with concrete during the present year.

There are nine commission merchants, and nine speculators doing

business on the premises besides agents from the leading abattoirs of the Dominion. The abattoir accommodations in connection with the yards are: P. Burns & Company, the Union Packing Company and the Calgary Packing Company. Sections in parts of the yard are allotted to commission men and in other parts allotments are made to speculators. The Yard Company supplies all feed according to the Live Stock Products Act, both delivering the hay and distributing it in the pens. The company is governed by the Dominion Live Stock Products Act.

The following table gives the receipts of cattle during the past five years:—

Year.	Cattle.	Hogs.	SheeE.	Horses.
1915.....	43,445	161,514	13,147	17,675
1916.....	71,870	121,568	25,087	23,084
1917.....	92,578	127,948	25,231	25,694
1918.....	145,545	139,675	51,659	25,154
1919 to Sept.30	123,886	71,539	37,215	26,158
1918 same period.....	88,085	104,640	23,468	20,187

LIVE STOCK EXCHANGES

THE MONTREAL LIVE STOCK EXCHANGE.

BY D. J. TANSEY, SECRETARY.

THE Montreal Live Stock Exchange was founded in March, 1916, through the efforts of Mr. G. L. Franklin, then vice-president of the Montreal Abattoirs, Limited, and Mr. Geo. C. Beall, head buyer for the Wm. Davies Company. Mr. Franklin, before coming to Montreal, had been connected with the live stock industry in Chicago and Toronto, where Exchanges have been in operation for a number of years, and knowing the benefits derived from these associations, undertook to place the buying and selling of live stock at Montreal on the same sound basis as existed in other live stock centres. Previous to that time the business of buying and selling was conducted in the same haphazard fashion that had been in vogue for 25 years. Buyers and sellers had to get to the market at daybreak, and very often after spending all day, remain at the yards until far into the night to secure their supplies, or dispose of their stock, as the case might be. The Exchange changed all that by having the market open at 8 o'clock in the morning and close at 5 p.m.

Drovers and farmers had to contend with an unfair system of commissions. The big shipper could get a substantial rebate on the commission. Another man would pay half commission while the small shipper paid the full commission. To-day the rates of commission are standardized. The drover has absolute assurance that his stock will be sold openly and fairly to the highest bidder, with no overcharges to one and undercharges to another.

Drovers and farmers had no protection against unscrupulous buyers. Anyone could come to the market and purchase a load of stock, giving his

cheque in payment, and it might be months before the farmer could collect any part of it, and very often it was a total loss. This risk is now eliminated, farmers in handling over their stock to be sold by a commission firm have the protection of the Exchange, and receive their cheque for the proceeds the same day the stock is sold. The exchange protects the country shipper by reason of having raised the standard of the character of its members by throwing every safeguard possible around their admission. No man of the get-rich-quick variety or men with a shady past or with a poor reputation for business honesty have any chance whatever to become members. The Exchange not only insists that the men admitted to membership shall be good men, but it also aims to keep them good. Good men sometimes go wrong, but if they go wrong they are confronted by stringent rules which provide for prompt investigation, and if guilty equally prompt expulsion and forfeiture of membership.

There is nothing in our rules that prevents a farmer from selling his own stock, independent of any commission firm. While guaranteeing the rights, it also protects the producer in as much as the Exchange is a court of appeal to which any shipper who feels he has been treated in an unfair or dishonest manner by any member can apply for relief and be absolutely sure of a prompt and thorough hearing, if the charges are in the nature of a dispute or misunderstanding, the Exchange will arbitrate it.

At the present time we have a membership of about fifty. Mr. James Tweedie in the president.

THE TORONTO LIVE STOCK EXCHANGE.

THE Toronto Live Stock Exchange was organized in February, 1910, under the Ontario Companies Act. Its membership at the present time is one hundred and fifteen. The Exchange has for its purpose the furtherance of all interests directly connected with the buying and selling of live stock at the Union Stock yards, and to promote and establish uniformity of customs and usages of the live stock trade, to provide for a speedy adjustment of business disputes between its members, and to promote in all respects the interests of the live stock trade in Ontario.

The officers consist of president, secretary-treasurer, and a board of five directors. A board of arbitration is appointed yearly for the purpose of reviewing and adjusting any grievances or disputes between members, dealers, drovers, or farmers trading on the Union Stock Yards.

The activities of the Exchange are not all confined to the buying and selling of stock, but such problems as transportation, care and feeding of stock in transit, shelter and accommodation at the yards are all zealously looked after in the interests of the farmer and shipper of live stock.

THE CALGARY LIVE STOCK EXCHANGE.

BY J. M. REID SECRETARY.

THE Notice on the accompanying blackboard is the keynote of an organization of 70 live stock men, named the Calgary Live Stock Exchange.

BULLETIN

CALGARY LIVE STOCK EXCHANGE

PUBLIC NOTICE

Report any Grievance or Irregularity in connection with Transactions within the Alberta Stock Yards to the President or Secretary.

It was registered on the 13th day of July, 1915, with 26 members. Its membership has increased step by step, with the development of the Alberta Stock Yards, Calgary, and there has always been a high ambition among stockmen to obtain a seat on this Exchange.

Included in its membership are breeders, feeders, dealers, commission men, shippers, buyers and salesmen, working for better and improved shipping and market conditions and

accommodation; for wide and profitable markets; for perfect regulation of market trading; of the movement of livestock, of railway, stock-yards, health and brand inspection service; for the adjustment and correction of grievances, for accurate market reports, and for Calgary as a live stock centre.

Expressed in the phrasing of the by-laws, etc., the Exchange was established, not for gain or profit, but for the benefit of all interests

connected with the buying and selling of livestock; to promote and establish uniformity in the customs and usages of the livestock trade; to provide for a speedy adjustment of business disputes; to secure to its members the benefit of co-operation for the furtherance of their legitimate pursuits; to promote the interests of the business; to provide for social intercourse among its members, and to enact rules, regulations, etc., for the purpose of carrying out these objects, and to impose penalties for the infraction of them.

The government of the Exchange is vested in a board of eleven directors, who also act when called upon as a committee of appeal from decisions of the arbitration board, whose functions are to deal with disputed claims. The executive under the by-laws thus deal with such matters as the management of the Exchange; the qualifications and disqualifications of members; direction of meetings; hours of business; complaints of railway or stock-yard service or charges; of adverse legislation, of cruelty to animals, of dishonest acts, of improper or uncommercial conduct, of the use of abusive or foul language; with methods of bidding, and of purchase, of weighing, of sale, and of payment of live-stock; with the licensing and bonding of members in business for themselves; with rates of commission; with the grading of hogs, and with the rights of shippers.

Every rule has been devised in the best interests of the live-stock producers whom they represent, members treating their customers as their best advertisement.

Although under the new Act, "The Live Stock and Live Stock Products Act 1917" the operation of a live stock exchange is required in connection with every stock-yard, it is noteworthy that before the passing of the Act, exchanges had already taken firm root on every well organized market.

Their scope and usefulness greatly varies. In the United States a Na-

tional Live-Stock Exchange co-ordinates the work of the various exchanges although there is as yet no Dominion Livestock Exchange in Canada. A branch of the St. Paul Live Stock Exchange handles all claims for loss and damages to live-stock in transit, claims for overcharge in weight, and rates on live-stock for 15 per cent of the amount collected, and last year its collections for the shippers amounted to nearly \$50,000.00. It also deals with railway traffic matters, such as proposed changes in rates, and stock schedules, adverse legislation, etc., and operates a clearing house compelling cash settlements within the twenty-four hour rule.

Kansas City Exchange, on the other hand, does not undertake to collect freight or other claims, although this is done at so much per car per monthly settlement by an outside organization. The exchanges at Omaha and Chicago both have claims departments, no charge to shipper where no collection is made. All of the United States exchanges have traffic men to protect the interests of the market and of the shippers, on matters of traffic, and employ hog "shrinkers" which is necessary on account of the method of handling grades on American markets.

The Chicago Live Stock Exchange, in conjunction with the state of Illinois, handles all cattle suspected of disease, and sells them at public sale for the account of the owners, to the highest bidders. It has a department, which has been working for some three years, for the purpose of eradicating tuberculosis in the food animals of the United States, and through its efforts have succeeded in securing appropriations by the federal and various state governments of approximately three and a half million dollars per year to be used throughout the country to reimburse producers for loss sustained by the killing of cattle and hogs in the government campaign of eradication.

The every day work of such an

exchange, operating on the largest livestock market in the world, regulating trade, collecting claims, disciplining members and protecting the shippers, requires a staff of twenty or thirty people.

At Calgary the work is voluntary, or at least semi-voluntary, and the Exchange has no permanent office and staff. At the same time it is very active in pursuing claims when filed, on account of bad railroad service, loading and unloading, delays and shortages. Meetings are well attended and regularly held, and accommodation for the ever increasing and extending business urged for. There is nothing affecting the producer and shipper but what the Exchange will use its power to remedy, and by regulation and discipline a high

standard of business methods has already been reached.

On the matter of handling claims the Exchange is about ready to take a forward step. There are not only the returns to look for, but better service immediately ensues as claim after claim is filed, reflecting on the management, which has reason to believe it is giving excellent service so long as there is no complaint.

At the invitation of the Health of Animals Branch this Exchange has undertaken to co-operate with the veterinary authorities to deal with the mange question, and has already held many public meetings, issued literature, and brought public interest, and the hearty co-operation of the ranchers of the province, to bear on the situation.

THE DWARF CORNEL AS A NATIONAL FLOWER

The Imperial Order of the Daughters of the Empire has taken a keen interest in the question of the choice of a national flower for Canada more especially as it relates to the selection of a flower for planting on the graves of Canadian dead in France and Flanders. The following communication from the Imperial War Graves Commission addressed to the Overseas Club and Patriotic League at Aldwych, London, England, which has reached *The Gazette* through the kindness of Professor R. B. Thompson of Toronto University, indicates that preference is shown by the Imperial War Graves Commission for the *Cornus Canadensis* popularly known as Dwarf Cornel or Part-ridge Berry.

"The Imperial War Graves Commission accept the kind offer of the Imperial Order of the Daughters of the Empire to supply

seeds of the *Cornus Canadensis*, for planting in cemeteries in which members of the Overseas Military Forces of Canada, fallen in the war, are buried.

The *Cornus Canadensis* is a beautiful flower, and most appropriate for planting over the graves of Canadians.

The Commission would be able to raise plants from seeds in their nurseries in France. All consignments of seeds should be forwarded to the above address, and addressed to the Secretary (Works), Imperial War Graves Commission". —

It may be added that Miss Mary E. Cox of Toronto representing the Imperial Order of the Daughters of the Empire has brought the matter before the Women's Canadian Historical Society which organization has endorsed the choice of *Cornus Canadensis*.

SHORT COURSE FOR CO-OPERATIVE SOCIETY MANAGERS

Good results are already beginning to appear from the nation-wide organization of co-operative live stock marketing associations in the United States. They propose to hold short courses for local association managers at each one of the large live stock terminal markets. The federal bureau of markets state agricultural colleges and other public and private interests connected with the live stock industry will be asked to furnish speakers and demonstrators. The courses suggested are as follows:—

1. Market Grading (a) Grading on the hoof. (b) Follow up at packing house to observe how grades kill out. (c) Relation of grading to co-operative shipment.

2. Accounting—(a) Efficient uniform systems of accounting for association managers. (b) Actual practice in working out accounts of a shipment.

3. General lectures and resume of successful methods of handling shipments from producer to packer buyer—(a) Feeding for terminal market. (b) boarding and care en route. (c) Care at commission yards.

The national Association of Co-operative Live Stock Shipping Associations will probably be represented by a lecturer whose aim will be to further the work of state and national organization. —

ASSOCIATIONS AND SOCIETIES

EVENTS OF THE MONTH

Jan. 14, 15, 16,—Annual meeting of the British Columbia Fruit Growers' Association will be held in the Court-House Vernon, B.C., secretary, Prof. F. M. Clement, University of British Columbia. Vancouver, B.C.

Jan. 8-9—Eastern Ontario Dairymen's Convention, Brockville; Secretary, T. A. Thompson, Almonte, Ont.

Jan. 12-16—The Saskatchewan Provincial Seed Fair under the auspices of the College of Agriculture will be held at Saskatoon, Sask; Secretary, The Director, Extension Department, College of Agriculture, Sask.

Jan. 13-16—Ontario Corn Show, Chatham; Secretary, P. L. Fancher, Chatham, Ont.

Jan. 13-16—The annual convention of the Agricultural Societies at the College of Agriculture, University of Saskatchewan, Saskatoon, Sask.

Jan. 14-15, Western Ontario Dairymen's Convention, London, Ont.; Secretary, Frank Hens, London, Ont. —

Jan. 13-15.—Manitoba Rural Credit Societies Convention, Winnipeg, secretary E. A. Weir, B.S.A., Director Rural Credit Societies, Legislative Building, Winnipeg, Man.

Jan. 15—Ontario Vegetable Growers' Association Meeting, Ottawa; secretary, J. Lockie Wilson, Department of Agriculture, Toronto.

Jan. 20-21—Ontario Agricultural and Experimental Union, Ontario Agricultural College, Guelph; secretary, Dr. C. A. Zavitz, O.A.C., Guelph.

Jan. 20-23—United Farmers of Alberta annual convention at Calgary; Secretary, H. Higginbotham, Calgary, Alta.

Jan. 20-23.—United Farmers of Alberta annual convention at Calgary; secretary, H. Higginbotham.

Jan. 22-23.—Dairymen's Association in Nova Scotia will hold their Dairy Convention at Truro; secretary-treasurer, W. A. McKay, Truro, N. S.

WORLD'S POULTRY CONGRESS

In the early part of September, 1921, there will assemble at The Hague, Holland, the First World's Poultry Congress, on the invitation of the Netherlands Government. Arrangements had previously been made for the holding of this Congress in 1916. Owing, however, to the outbreak of the European War it had necessarily to be postponed. With a renewal of the invitation from the Dutch Government, the project is now going forward.

An Executive Committee has been formed, consisting of representatives nominated by the Dutch Minister of Agriculture and the International Association of Poultry Instructors and Investigators, the latter society having been responsible for the steps leading to this invitation. A meeting of this Committee was held recently at The Hague, under the presidency of Dr. J. H. Louvink, Food Controller to the Netherlands Government, at which there was a full attendance. Proposals were considered as to the arrangements, programme, etc. Dr. J. H. Louvink, was appointed National President, and Edward Brown, F.L.S., International President. It is intended to hold during the period of the Congress a non-competitive display of breeds of poultry from as many countries as possible, so as to bring together a complete collection for the first time, and of appliances. In October, 1920, there will commence at The Hague a great International Laying Trial extending to September, 1921, at which it is hoped that representative pens

of fowls from all the leading countries will be entered.—

The Congress will include in its programme all aspects of the poultry industry in every part of the world, embracing scientific and practical questions, instruction and investigation, breeding problems, production of eggs and poultry on distinctive lines and in association with agriculture, the national and international trade in these products, disease, etc. Invitations will, in due course, be issued inviting Ministries and Departments of Agriculture and other public bodies, teaching institutions, experiment stations, poultry and agricultural societies, and trading societies, to appoint delegates to the Congress. Individual members will also be accepted. Further announcements will be made from time to time as arrangements are completed. It is hoped to form Congress Committees in many of the countries interested in this branch of food production, and to secure the presence of and contributions in the way of papers from the most eminent and constructive workers throughout the entire world. The General Secretary is G. S. Van Gink, 10, Koningin Mariastraat, The Hague, Holland, and Mr. Edward Brown, F.L.S., 31, Essex Street, Strand, London, W.C. 2, England, has the international organization in hand.—William A. Pippincott is Secretary International Association of Poultry Instructors and Investigators, Kansas State Agricultural College, Manhattan, Kansas.

CANADIAN PHYTOPATHOLOGICAL SOCIETY

The first annual meeting of the Canadian Phytopathological Society was held at the Ontario Agricultural College, Guelph, on Thursday and Friday, December 11 and 12. A large number of plant disease investigators from all over Canada were present.

Dr. E. C. Stakman of the University of Minnesota, who has charge of the grain rust investigations for the United States, was a guest of the Society. He gave two most interesting illustrated addresses in which he told of the appalling losses due to grain rusts in the United States and Canada and described the methods which were being devised to reduce these losses. Dr. Stakman laid special emphasis on the destruction of the common Barberry and its varieties. He also pointed out the importance of breeding varieties of wheat resistant to rust, suited to the different grain growing districts of the United States and Canada.

The object of the conference was to stimulate research work which will result in the reduction of losses due to plant diseases. Among the important papers of interest to the general public were:—"Witches Broom of the Canada Balsam" Dr. R. E. Stone. "Smut of Western Rye Grass"

Mr. W. P. Fraser. "New or Little Known Potato Diseases." Mr. P. A. Murphy. "Peach Yellows and Little Peach" Professor L. Caesar. "Decay in the Timber of Pulp and Paper Mill Roofs" Mr. R. J. Blair. "Leaf Roll and Mosaic of Potatoes" Professor J. E. Howitt. "Leaf Blight of the White Pine" Dr. J. H. Faull. "Butt Rot of the Balsam Fir" Dr. W. H. Rankin. Dr. A. H. R. Buller of the University of Manitoba presented two most excellent illustrated papers dealing chiefly with fleshy fungi which were much appreciated by the members of the Society.

The officers elected for the year 1920 were,—

President—Dr. A. H. R. Buller, University of Manitoba.

Vice-President—Dr. J. H. Faull, Toronto University.

Secretary Treasurer—Dr. R. E. Stone, Ontario Agricultural College.

Member of the Council—

Professor J. E. Howitt, Ontario Agricultural College.

Mr. F. L. Drayton, Central Experimental Farm, Ottawa.

THE CANADIAN SOCIETY OF TECHNICAL AGRICULTURISTS

There has begun the organization of the Canadian Society of Technical Agriculturists. The movement began at a reunion of the McGill agricultural graduates in August 1919. The objects of the society are as follows:—

1. To advance the cause of scientific agriculture in its various phases, and bring the members of the profession to a fuller realization of the importance of their calling. —
2. To bring about a closer co-operation between all workers engaged in the agricultural profession in Canada, and aid in bringing about a closer co-operation and co-ordination of the Federal and Provincial administrations in agriculture.
3. To aid in ensuring the employment of technical men for technical positions by bringing the public at large to a fuller realization of the value of competent technically trained agriculturists.
4. To aid in attracting the best men to the profession by attempting to establish

an adequate standard of remuneration for technically trained men and women.

5. To serve as a medium for keeping employers of technically trained men in touch with competent eligibles.—
6. To bring about a closer co-operation between the profession as an organized body, and the various agricultural associations throughout Canada, and wherever possible to aid them in their organization and propaganda work.
7. To serve as a medium where progressive ideas for improvement in agricultural education, experimental, research and publicity work, etc., can be discussed and formulated into practicable working form and recommended for adoption when deemed advisable. —
8. To ultimately serve as a medium for the publication of a journal in the interests of scientific agriculture, in which advanced ideas for the development of the industry may be exchanged.

The Acting Secretary of the organization committee is Mr. F. H. Grindley.

THE ROYAL AGRICULTURAL WINTER FAIR ASSOCIATION

Preparations are being made for the holding of the Royal Agricultural Winter Fair annually in Toronto. At a meeting of representatives of live stock and other organizations held in Hamilton to decide

between Hamilton and Toronto for the location of the show it was decided in favour of Toronto. The show will bring together an exhibition of national character of live stock, dairying, seeds, and poultry. The

city of Toronto agrees to provide a suitable building in the Canadian National Exhibition grounds fully equipped for holding the show. To finance the operation of the show the Ontario Government, the Dominion Government, and the live stock associations will contribute funds.

Following are the officers of the Association charged with the management of the show—President, W. A. Dryden, Brooklin; vice-

president, H. C. Cocks, Toronto; executive committee, G. W. Waller, representing the Canadian Packing Company, Toronto; J. J. Morrison, secretary of the United Farmers of Ontario, Toronto; Harry McGee, representing the T. Eaton Company, Toronto; W. W. Ballantyne, Stratford, and George Pepper, Toronto; Acting secretary and treasurer, Professor Geo. E. Day, Guelph.

WOMEN'S INSTITUTES, OF PRINCE EDWARD ISLAND

BY DELLA E. SAUNDERS, SUPERVISOR

The Sixth Annual Convention of the Women's Institutes of P.E.I. was held in the Household Science Rooms of the Department of Agriculture, Charlottetown, Nov. 6th, and 7th. There was a good attendance considering the very unfavourable weather.

"Our Rural Communities", "Literature for Young People", "Women's Work in War and Peace", "Music as a Factor in the Home and the Community", "Better Rural Schools for P.E.I.", and "Hot School Lunches" were subjects taken up by the Convention and interesting discussions followed each address. The delegates showed the keenest interest in the different topics but anything tending to the betterment of the rural schools was especially favoured by them.—

The Reports of the Institutes showed that since the need for war work had ceased, school and community improvements were the aims of all the Societies. Considerable work has already been done along these lines but there still remains much more to be accomplished. Some of the Institutes are working for a community hall, some are buying pianos for their halls, while many have put pumps in the schools, supplied

new desks, hardwood floors, blackboards, drinking fountains, etc. as well as seeing that the school house and out-buildings are repaired and kept in a sanitary condition. Some schools have been painted, inside and out, the yard fenced and an attempt made to beautify the grounds by planting trees and flowers.

For a number of years the members of one institute have planted 2 dozen trees, each year, along the main street of the village, thus helping to "make beautiful" their town.

Some of the Institutes have one of their members on the Board of School Trustees and it is hoped that soon, every School Board in the province will have one such representative.

An amendment to "The Compulsory School Attendance Act" and Medical and Dental Inspection of School Children are some of the things which the delegates to the Convention decided to ask for, from the Government.

During the next year untold benefits for the Rural Schools are looked for as a result of the work done for them by the members of the Women's Institutes.

THE ONTARIO PROVINCIAL WINTER FAIR

According to the statement made by the Hon. Manning Doherty, Minister of Agriculture for Ontario, at the formal opening of the Ontario Provincial Winter Fair held at Guelph in December, 1919, Guelph is to remain a centre of provincial live stock interests for some time to come. It was indicated in several addresses by prominent speakers that the Ontario Provincial Winter Fair and similar exhibitions will in future act as feeders for the National Live Stock Winter Fair which is to be established at Toronto during the present year.

This year is the thirty-sixth anniversary of the Winter Fair and it continues to grow. Live Stock of all kinds, including beef and dairy cattle, sheep and swine, were exhibited in large numbers while the poultry exhibition outclassed all previous records and was perhaps the greatest ever held on this

continent. The horse exhibit was one of the best in the history of the Guelph show, more particularly does this refer to the heavy weight class. The light horse entry is slowly getting smaller year by year but the heavy draft horses are holding their own and more. The exhibits from the standing field crops competition and the Ontario Seed Growers Associations' entries were equal to any previous year and the seed auctioned at excellent prices.

The live stock breeders, poultry raisers, seed growers, and all others interested in Ontario agriculture were greatly relieved to show that the Ontario Provincial Winter Fair, which has annually been held at Guelph for so many years with such a measure of success, will continue to make its headquarters at Guelph.

O. A. C. LIVE STOCK SALE

At the annual public auction sale of live stock in connection with the Ontario Agricultural College, the quality of stock was about the average although not so many animals as usual were auctioned. There was a large attendance of farmers and stock breeders from all parts of the province and demands for high class stock produced at the institution was keen. Excellent

prices were obtained. The total amount of the sale was about \$7,500. The Short-horns were the most numerous of the beef breed. Among the dairy animals were Holsteins and Ayrshires while the sheep and swine were numerous and the latter brought prices higher than were expected and there was a good demand for them.

THE WESTERN CANADA SHORTHORN SHOW AND SALE ASSOCIATION

The Western Canada Shorthorn Show and Sale Association made up of the Shorthorn associations of Manitoba, Saskatchewan and Alberta held a joint sale of animals contributed by the members at Brandon, Manitoba on November 20th and 21st. The offerings consisted of sixteen males and eighty-six females. The males brought an average price of \$777.50 the prices ranging from \$2,500 for the two-year-old Star of Hope to \$240 for Royal Valentine. The females averaged \$485.58 ranging from \$5,000 for the yearling Lavender 47th to \$130.00 for Lady Ramsden. The animals were well distributed. Twenty-seven head were purchased by United States buyers,

forty-four head remained in Manitoba, twenty-eight went to Saskatchewan, two to Alberta and one to Ontario. Previous to the sale the animals were judged by Professor G. E. Day, Secretary of the Dominion Shorthorn Breeders' Association. The male championship was won by The General, a three-year-old contributed by the Honourable Duncan Marshall, Minister of Agriculture of Alberta which brought \$1,025 in the sale. The female championship was won by Nonpareil Lady of Sylvan 5th, shown by C. G. Beeching, De Winton, Alta. that brought in the sale \$1,400. The secretary of the association is Mr. J. B. Davidson of Carman, Man.

WESTERN CANADA LIVE STOCK UNION

The annual convention of the Western Canada Live Stock Union was held at Victoria B.C. The following officers for the coming year were elected,—Honorary President, Hon. Dr. S. F. Tolmie; President, G. H. Hutton, Calgary; vice-presidents,—for Manitoba, Andrew Graham, Roland; for Saskatchewan, F. H. Auld, Regina; for Alberta, George Hoadley, M.P.P., Okotoks; for British Columbia, A. D. Patterson, Ladner; secretary-treasurer, E. L. Richardson, Calgary.

A considerable number of important resolutions were passed at this meeting.

These included resolutions dealing with feed standards, live stock market reports, the Board of Commerce in its relation to the live stock industry, supervision of live stock in transit, the one-half per cent insurance deduction under the Meat and Canned Foods Act, the sliding scale of retail meat prices, and a resolution affecting the railroad and live stock contract.—

Representatives of the major live stock associations of the four western provinces were present at the convention and took an active part in the discussions at hand.

EDMONTON EXHIBITION ASSOCIATION

At the Spring Live Stock Show which will be held at Edmonton from March 29th to April 3rd there are several special classes open to children between 9 and 17 years of age. The rules and regulations provide that in the calf feeding competition the

competitors must have fed, cared for, and fitted the animal from the 1st of January, 1920, and must personally exhibit the animal in the show ring when judged or paraded. In the sheep and swine competition the competitor must have fed, cared for, and

fitted the entries from the first of February, 1920, and must personally exhibit the animal in the show ring when required. There are three competitions in all. The calf feeding competition, Section A.—Beef Classes—steers or grade heifer calves of 1919. Section B.—Dairy Classes—Pure bred or grade heifer calves of 1919.

The total prizes in Section A. amount to \$880 besides the large number of valuable special prizes. In Section B. the cash prizes amount to \$265 besides special prizes and donations. In the children's sheep feeding competition the prizes amount to \$75, and in the pig feeding competition, besides the large number of special prizes, cash awards to the amount of \$740 will be given.

BRITISH COLUMBIA GOAT BREEDERS' ASSOCIATION

Goat exhibitions were made at the New Westminster, Duncan, and Vancouver fairs in the province of British Columbia. Classes were provided for Saanen, Toggenburg, Nubian, and grade animals, and at the Vancouver and New Westminster fairs

milking competitions were held. The following table shows the records made at the New Westminster fair on October 2nd and 3rd. At the Vancouver fair a number of the same animals competed. The records made were much the same.

Goat Milking Competition at New Westminster Fair, October 2 & 3, 1919.

Name of Animal	Total lbs. of Milk.	Total lbs. of Fat.	Points for Milk.	Points for Fat.	Points for SNF.	Days in Milk.	Points for days in Milk.	Points off under 4%	Total points	Rank	% of 1st day.	Fat 2nd day.
Beacon Lass.....	9-85	4-82	9-85	9-64	4-43	76	6	.....	24-52	1	4-9	4-9
Janet.....	10-05	3-59	10-05	7-18	4-42	179	2-32	2	21-97	2	3-2	3-9
Ruth.....	6-5	3-05	6-5	6-1	3-04	415	6-0	.....	21-64	3	4-8	4-6
Penrith Beauty.....	8-05	4-19	8-05	8-38	3-68	129	1-48	.....	21-59	4	5-2	5-2
Brownie.....	7-9	3-96	7-9	7-92	3-62	166	2-10	.....	21-54	5	4-8	5-2
Rena.....	8-7	3-57	8-7	7-14	4-1	101	1-02	.....	20-96	6	4-0	4-2
Topsy.....	9-4	3-48	9-4	6-96	4-15	109	1-15	2	19-66	7	3-6	3-8
Bessie.....	3-2	1-82	3-2	3-64	1-67	142	1-7	.....	10-21	8	5-6	5-8

THE UNITED FARMERS OF ALBERTA DISTRICT ASSOCIATIONS

BY H. HIGGINBOTHAM, SECRETARY

1. District associations may be formed, if deemed necessary, in order to assist in carrying out the objects of the central Associations, by any number of locals grouping themselves together on the basis of useful combination for marketing purposes or on such other basis as the executive may approve.

2. District associations shall be required to report to the executive the objects for which formed or if incorporated, shall file with the executive a copy of the articles of incorporation and by-laws.

3. District associations shall be required to report to the central secretary and shall stand in the same relation to the association as a local, except as to the payment of dues and the right to send delegates to the convention.

4. District associations shall be required to pay an annual fee of \$5 to the association. Extract from U.F.A. Constitution, Section XIII.

The above sets forth briefly the objects and manner of formation of district associations. There are a number of successful District Associations in the province, among which we might mention the following:

Wetaskiwin District Association, Secretary, A. P. Moan, Wetaskiwin.

Tring District Association, Secretary, J. Trimmings, Kitscoty.

Coronation District Association, Secretary, F. Burns, Coronation.

Manville Livestock Shipping Association, Secretary, C. B. Wood, Manville.

Carstairs District Association, Secretary, W. E. Lancot, Carstairs.

It has been found in many districts that co-operative trading and livestock shipping work can be carried on more effectively by a combination of locals, rather than locals acting independently of one another. As a rule the district association comprises from half a dozen to fifteen or twenty locals, which are grouped around the central trading point.

The district association also has its educational advantages, as the members who attend the district association meetings get a wider viewpoint than the individual local. Most of the locals appoint their president and secretary as delegates to the district association meetings.

Another advantage of the district association is that a combination of locals engaging in co-operative trading and livestock shipping can afford, out of the proceeds of their co-operative work, to pay the salary of an efficient secretary, who can give his whole time to the work. This secretary then acts as manager of the co-operative trading enterprises of the district association. Some of the larger district associations in addition to a secretary employ a livestock shipping agent, who assembles the livestock and accompanies it to the central market.

A district association promotes inter-

course between the various locals and gives them a better understanding of each other's work and problems. Such matters as road improvements and municipal matters where a whole township or two or three townships are affected can be handled much more efficiently by the district association. Also the district association gives an opportunity for each local represented in the district association getting to know the very best men in their district, and in this way they are better informed on the capabilities of men whom they wish to nominate as district directors at the annual convention.

NEW PUBLICATIONS

Teaching Home Economics, by Cooley, Winchell, Spohr, and Marshall, published by the MacMillan Company of Canada, offers suggestions for the organization, administration, and teaching of home economic studies. It draws the distinction between home economic studies as organized for general or liberal educational purposes and such lines as specialized vocational training as may have grown out of them. —

The Canadian Guernsey Herd Book, Vol. 1 containing pedigrees 1 to 1719, compiled and edited in the office of the Canadian National Live Stock Records, Ottawa, 1919, is published by the Canadian Guernsey Breeders' Association. This volume contains also the rules of entry, scale of points for bulls and cows, and general information regarding the Guernsey breed of cattle.

Birds of Eastern Canada, Memoir 104, No. 3 Biological Series, by P. A. Taverner, is issued by the Department of Mines, Ottawa, Canada. This book has been written to awaken and stimulate an interest in the study of Canadian birds and to suggest the sentimental, scientific, and economic value of that study; to assist in the identification of native species and to furnish the economist with a right means of determining bird friend from bird foe. Fifty coloured plates of Canadian birds also appear in this work.

ONTARIO

The Report of the Minister of Agriculture for the Province of Ontario for the year ending October 31st, 1918, contains complete information on the work of the Department including agricultural schools and gives detailed accounts of the activities of each branch.

Report of the Horticultural Experiment Station, Vineland, 1918. The report shows that the farm was increased by rental and purchase of fifty-seven acres of land by the addition of two new green houses. A review of the experiments undertaken and the results achieved during the year are recorded.

The Fiftieth Annual Report of the Fruit Grower's Association of Ontario 1918 contains the minutes of the annual meeting held in Toronto in February 1919, the treasurer's report, the officers and committees for 1919 together with papers submitted by leading horticulturists on the continent. —

The Agricultural and Experimental Union, 1918, Fortieth Annual Report presents the information submitted to the members of the Union on January 14th and 15th, 1919, at the convention held in Guelph. The secretary of the Union is Professor C. A. Zavitz, Ontario Agricultural College, Guelph.

The Ontario Beekeepers' Association's Thirty-Ninth Annual Report gives a report of the annual meeting held in February, 1919 in Toronto and contains the various reports and addresses presented at that meeting. The secretary-treasurer is Professor F. Eric Millen, B.S.A., Ontario Agricultural College, Guelph.

MANITOBA.

Manitoba Agricultural College Annual Report for 1918 gives a complete account of the activities, changes and extensions of the various departments at the college during the year. —

Sewage Disposal for the Country Home. Extension Bulletin No. 43, by L. J. Smith, B.S., deals comprehensively with the various satisfactory methods of disposing of sewage in country places. Further advice on the disposal of sewage is given by the department of agricultural engineering, of the Manitoba Agricultural College.

MISCELLANEOUS

Vocational Agricultural Education by Home Products by Rufus W. Stimson is a volume of agricultural education through home projects. It treats the subject in detail giving clear information on all phases of agricultural education as taken up in the New England states.

NOTES

The British Columbia Goat Breeders' Association at the end of October had a membership of 332.

The Ontario Poultry Association's Show held at the Ontario Provincial Winter Fair at Guelph in December was the largest and best of its kind ever held in North America. Over 7,000 birds were on exhibition.

The children of the Windsor Nova Scotia school adopted a unique plan of exhibiting their canned fruits and vegetables by placing them in the store windows throughout the town. Suitable explanatory cards accompanied the exhibits.

A potato growing contest will be conducted in Nova Scotia under the direction of the provincial Department of Agriculture and the management of the Dominion Atlantic Railway to promote greater agricultural development in western Nova Scotia.

At the general congress of Women's Clubs and Homemakers' Clubs held in Quebec city recently a resolution was passed recommending that a quarterly review be established under the title of "La Bonne Fermière" as the official organ of the clubs.

Mr. T. J. Harrison, Professor of Field Husbandry in the Manitoba Agricultural College reports that sunflower silage was produced at a cost of \$2.09 a ton. The crop was produced at the rate of 30 tons per acre. The silage is being tested in comparison with corn in the feeding of cattle.

The provincial council of women's clubs and homemakers' clubs of Quebec decided to be represented at the "Fédération Nationale Saint Jean Baptiste" by three delegates,—Mme. Arsene Dionne, Mme. Mathias Ouelette, and Mlle. Marie Antoinette Brodeur.

Alberta College of Agriculture has purchased five Hereford heifers which they have added to the herd of the University Farm. Two of these Hereford heifers were purchased from the Curtis Cattle Company of Calgary and three from John Wilson, Innisfail. They are all of excellent breeding.

The report of the secretary of the Garden ers' and Florists' Association for 1918-19 states that during the year eleven well attended meetings were held. The association now has 125 paid up members as compared with 61 last year. This association meets in Toronto and has a branch of 40 members at Oakville.

In the province of Nova Scotia candidates for Rural Science diplomas are expected to report on a prescribed reading course to be followed between summer terms. These

candidates have been recommended to read at least one book bearing on the subject. The book suggested by the Director of Rural Science is "The Rural Teacher and His Work" by Foght published by the Mac-Millan Company of Toronto.

The Elmbank community in Peel County have been holding very successful "Saturday Nights." The neighbours gather together in the community hall and enjoy sociable and pleasant evenings. Refreshments are usually served and the entertainment is varied, sometimes being of an educational nature and at other times a dance is held.

The British Columbia Stock Breeders' Association have decided to hold a bull sale in Kamloops on March 10th. It will precede the Calgary spring bull sale and will thus enable British Columbia purchasers who do not secure what they want at Kamloops to purchase the animals they need at Calgary. The secretary of the association is Geo. Hay, Kamloops, B.C.

A circular letter bearing the signatures of the secretary-treasurer and the superintendent of Alberta Women's Institutes has been sent to the secretary of every women's institute in the province asking for clothing and financial aid for the use of families that have suffered through repeated crop failures. The institutes are asked to organize work in accordance with local conditions. For the reception of the goods contributed a women's institute relief depot has been opened at Calgary.

The bureau of marketing of the United States Department of Agriculture is preparing accounting systems which will form the basis of courses in market accounting at twenty-six colleges this year. These accounting systems have been prepared for use in country grain elevators and creameries. Their value has been demonstrated by 800 actual installations. The text, which was available by the middle of December, may be obtained by colleges upon application free of charge for the first year.

Judging teams representing the Ontario Agricultural College, the Macdonald College and the Manitoba Agricultural College competed in the International Judging Competition held at the International Live Stock Exhibition at Chicago last month. The Canadian colleges stood as follows: Manitoba, 12th, Ontario, 15th and Macdonald 18th. Texas Agricultural College won first, Nebraska, second and Kansas third in the eighteen teams competing.

Representatives selected by various rural telephone companies in Saskatchewan are being given a three weeks' course in locating

and removing telephone troubles in the laboratory fitted for that purpose in the basement of the provincial parliament buildings at Regina. These courses begin on January 2nd, January 23, February 16, and March 18th and last for three weeks each. During each course the pupils are given as full instruction as possible. In both theory and practice of telephone operation and management.

For the purpose of building up an Organization and Emergency Fund, the British Columbia Fruit Growers' Association has issued an appeal to its members asking for an appropriation based on the amount of fruit shipped, on the basis of one-quarter of a cent per box of apples, crab apples, and pears, one-quarter of a cent a crate of all berries, and one-eighth of a cent a box on all stone fruits. The fund will be used to deal with the larger questions that will arise affecting the fruit industry of the province.

Exhibits from the province of Saskatchewan entered for competition at the International Hay and Grain Show recently held in Chicago were successful in winning many

important awards. The prizes won included the first six prizes for spring wheat, fourteen prizes for spring wheat out of a total of twenty-five, the first, fourth, seventh, ninth, tenth and eleventh prizes for oats and the second prize for white wheat. Saskatchewan exhibits were also successful at the International Soil Products exhibition held at Kansas City, Mo., where a Saskatchewan exhibitor won first prize and championship for both wheat and oats.

A collection of well grown vegetables produced on virgin soil fertilized only by manure made by rotting a quantity of common bracken fern was exhibited at the Vancouver exhibition by Mr. A. Hornby, a gardener at the botanical garden of the University of British Columbia. It is now conceded that bracken is a cheap and valuable fertilizer in certain sections of British Columbia. According to analysis made by Dr. F. T. Shutt at the Central Experimental Farm, Ottawa, this fertilizer contains 29 per cent nitrogen, 4 per cent phosphoric acid and 1.52 per cent potash. Its total composition is moisture 8.00, organic matter 85.22, ash 6.78, total 100.

INDEX TO PERIODICAL LITERATURE

The Canadian Countrymen, Toronto, Ont., Dec. 13.

The Farm With a Hundred Hens. A. L. Dorrance, Poultry Division, Experimental Farm, Ottawa, page 4.
How to Cut a Pattern Rafter. E. W. Kendall, Lecturer in Manual Training, Ontario Agricultural College, page 5.

The Canadian Poultry Journal, Hamilton, Ont., Dec.

How to Hatch Successfully with Incubators. F. C. Elford, Poultry Husbandman, Ottawa, page 373.

The Educational Review, Fredericton, N.B., Dec.

The Carleton Co. Vocational School. R. W. Maxwell, Director, Vocational School, Woodstock, N.B., page 86.

The Farm and Home, Vancouver, B.C., Dec. 11.

B. C. Dairyman Close Their Butter Making Competition. A. F. Wiancko, Provincial Dairy Instructor, page 4.

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The Declining Cheese Industry. H. H. Dean, Professor of Dairy Husbandry, Ontario Agricultural College, page 2168.

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PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty International Institute Commissioner, Department of Agriculture, West Block, Ottawa.

SCIENCE AND PRACTICE OF AGRICULTURE

CROPS AND CULTIVATION

166—New Experiments on the Use of Electricity in Agriculture in Argentina.—LEVYLIER, H. M. in *Le Genie Rural*, Year XI, No. 86-87, p. 16. Paris, 1918.

A series of investigations lead the author to study the use of barbed wire or artificial bramble as earthing for lightning conductors and anti-hail apparatuses. The results, which were in perfect agreement, bore on the study of oscillating electric discharges. From 1911 to 1912 the author undertook in the province of Mendoza, Argentina, very successful experiments on the use of electricity with anti-hail apparatuses which had to be stopped for financial reasons. He, however, continued his investigations and made tests of the diffusion in vegetable mould by artificial bramble of very weak, but very frequent oscillating discharges derived from a variation of the electric charge of the atmosphere immediately above the crops.

In November, 1917, the author installed an electro-cultural device in a maize field in Maximo Paz. The field chosen, 328 ft. x 262½ ft., was divided into two parts, one 197 x 262½ ft., the other 131 x 262½ ft., used as a control. The air and light conditions were the same over the whole experimental field. To test thoroughly the fertilizing action of the points in the soil the experimental field was divided into three plots. Plot 1 received the electricity from small brushes on wooden poles 7½ ft. high and distributed it to barbed wire placed at 4 inches below the soil throughout the 262½ ft. of the plot. Plots 2 and 3 had, on the contrary, artificial bramble on the top of the poles and 6½ ft. earthings on either side of each.

Results.—Plot 1:—925.8 lb. of grain (maize); Plot 2, 775.9; Plot 3, 705.3; Control plots 4 and 5, 484.9 lb. As compared with the control the increases were, therefore, 87%, 56% and 47%, i.e. an average of 63.4%.

It seems, therefore, clear that the electricity diffused through the soil was the

principal factor in these increases. The maize stems were also higher and much stronger. These tests confirm the author's hypothesis as to the value of artificial bramble as earthings for lightning conductors; their use would protect the houses and even the moveables, in the country. These experiments show the possibility of protecting from hail large districts which suffer greatly from it, at (normal times) a relatively small cost.

Sod, Tillage, and Fertilizers for the Apple Orchard.—COURLEY, J. H., in *New Hampshire Experiment Station Bulletin* 190, pp. 3-40. Durham, N.H. 1919.

A further contribution to the long-continued orchard management investigation being conducted at the station, in which is presented a 10-year summary of the more practical results of various cultural and fertilizer treatments, such as yield and growth of the trees and size of fruit in the different plots.

Trees growing in sod have not yielded sufficiently well to warrant the use of the land for orcharding. They have made such inferior growth most seasons that they were less able to withstand the destructive influences of weather and parasites. Clean cultivation, without the use of cover crops, has proved to be a successful method in the reclamation of a run-down orchard, increasing the yield nearly 100 per cent and increasing the growth and general vigour of the trees. At the end of the 10-year period, however, the trees were not making as good an average growth as at the end of the 5-year period, indicating that this treatment could not be continued over a longer period of time.

Tillage with cover crops every other year resulted in decided benefit to the trees, but was less satisfactory than annual tillage either with or without cover crops. Annual tillage with cover crops has proved to be a slightly better system to follow than clean tillage, and has given practically as good results as any treatment followed. The cover crops, however, show decided evidence

of the need of additional fertility, and the trees in this plot are somewhat less vigorous than during the earlier years of the experiment. Commercially the annual tillage on the cover crop plot has been the most profitable plot in the orchard, and this system is recommended for the run-down orchards throughout the State.

The fertilized plots have failed to respond to either treatment in yield of fruit, as they have made very slight gains. They have responded better in growth, which was not distinguishable, however, until after the sixth year when the larger size of trees was noticeable, and also the darker green colour of the foliage. There was no preponderent difference in favour of any of the combinations of complete fertilizer used in the different plots. The combination richest in potash has given the largest apples throughout the experiment, the general quality of the apples being perhaps somewhat better than in the fertilizer plots. Lime has had no obvious effect upon this orchard.

The experiment, as a whole, shows in a most emphatic way the importance of selecting a proper site for an orchard, since the losses from frosts and freezes in a poorly located orchard are disastrous. This experiment indicates that an apple orchard receiving a good system of cultivation responds slowly to the use of chemical fertilizers. In other soils and under other conditions the response might be more marked. It is pointed out that other experiments which will shortly be reported upon show that it is usually necessary to fertilize an apple orchard which is not being cultivated, and that returns are almost immediate in that case. The author recommends that the orchardists of the State apply fertilizers at about the following rate per acre as a trial before they make general use of them: 150 lbs. nitrate of soda, from 200 to 300 lbs., acid phosphate, and from 50 to 100 lbs. of sulphate or muriate of potash.

Some Effects of Successive Cropping to Barley.—GERICKE, W. F., in *Journal of American Society of Agronomy*, Vol. 9 No. 7, pp. 325-332. Lancaster, Pa., 1917.

This paper, a contribution from the University of California, discusses some of the effects of continuous cropping to barley on a fertile soil under greenhouse conditions, the successive crops being grown concurrently in order to eliminate, as far as possible, such environmental factors as climate and season. Tabulated data are presented showing the length of the period of harvest, tillering, height of stalk, weight of grain for the individual heads, and average weight of kernel per head. Certain relationships have been emphasized and discussed as follows: Those showing the different kinds of stalk production and maturation of the crops, those showing the total and average height of the different kinds of stalks of the crops,

and those showing the quantity and quality of grain produced as related to the height of stalk in each crop. Pots producing from one to four crops were represented in the series.

In summarizing his observations the author states that plants of the fourth crop matured with greater uniformity than those of any of the other crops. There were no barren stalks in the fourth crop. The number of tillers and barren stalks increased with the plants grown in the soil of a lesser number of crops. The total height of all the stocks produced decreased with each successive crop, but the average height of the individual stalks increased with each successive crop. In the fourth and third crops the heaviest grain, both as to weight per head and as to average weight per kernel, varied with the height of the stalks. The tallest stalks produced the largest heads and the largest average weight per kernel. In the second and first crops no correlation between the height of stalks and weight of grain per head or average weight per kernel was obtained.

169—The Storage of Sulphate of Ammonia on Farms.—*The Journal of the Board of Agriculture*, Vol. XXV, No. 6, pp. 703-705. London, September, 1918.

Ammonium sulphate may be preserved in sacks or loose in a heap. In either case the building in which it is stored should be dry and free from dampness. When kept in sacks they should be piled on a platform raised about 6 in. from the ground so that the air can circulate freely. Should there be any difficulty in constructing a platform the sacks should be piled on one or more layers of hurdles. Before building the platform the floor should be covered to a depth of about 3 in., with a dry substance which will absorb any moisture which may drain off the sacks. The best substances for this purpose under ordinary conditions are castor meal, rape meal or raw bone meal as they can afterwards be used as fertilizers. If these substances are too expensive, as at the present time, dry earth, sand, peat, moss, or sawdust may be used. It is not advisable to use superphosphate, and on no account should chalk, lime, or basic slag be used as they set free the ammonia. If free from all dampness ammonium sulphate keeps very well without losing any of its fertilizing power. Farmers should, wherever possible, purchase "neutral" ammonium sulphate (containing less than 0.025 per cent of free acid) because this quality does not rot the bags as do those containing more free acid. It is for this reason that many farmers empty the sacks as soon as they receive them and keep the fertilizer in heaps.

This second method calls for the same precautions as the first. If the ammonium sulphate is lumpy, it should be broken up and passed through a $\frac{1}{4}$ " riddle before use. "Neutral" ammonium sulphate does not cake, but remains free, like sand.

170—Ammonico-Potassic Nitrate, a New Fertilizer For Sugar Beets.—HOFFMANN, M., in *Die Deutsche Zuckerindustrie*, Vol. XLIII, No. 19, pp. 149-150, Berlin, May 1918.

Since 1917 experiments have been made in Germany on small plots, on the use, as a fertilizer for beets, of ammonico-potassic nitrate, obtained at the "Badische Anilin- und Sodafabrik" by treatment and double decomposition of ammonium nitrate with potassium chloride. The fertilizer, also known as "mixed salt" ("Mischsalz"), is granular, brownish-grey, spreads easily, and contains 13 per cent of nitrogen, 25 per cent of potassium, 3 to 4 per cent of water, and 27 to 30 per cent of chlorine.

This compound may be safely used as a fertilizer. It is preferable to ammonium sulphate as it spreads more evenly, absorbs less moisture, and is less explosive. Experiments made by Prof. Schneidewind on beets in the sandy loam of the Lauchstadt Experiment Station, showed the value of the new fertilizer to be exactly equal to an equivalent quantity of sodium nitrate. The makers also intend putting on the market ammonico-sodium nitrate. The ammonium chloride put on the German market in 1918 contains from 23 to 25 per cent of nitrogen and is as satisfactory as ammonium sulphate. It should, however, be used with care when added to plants sensitive to chlorine.

The Pollination of Greenhouse Tomatoes.—

White T. H., in *Maryland Agricultural Experiment Station, Bulletin* 222, pp. 93-101. College Park, Md., 1918.

Four crops of tomatoes were grown in these studies, J. W. Reichard and A. White assisting in the work. Natural pollination was compared with hand pollination, 10 varieties being used.

Generally speaking, hand pollinations made a large increase in the quantity and size of the fruit. The Chalk Jewel variety was least benefited by hand pollination and did not bear heavily under either method. The Hubert Marvel and Sterling Castle varieties set fruit nearly as well with natural as with hand pollination. Reichard suggests that this is due to the fact that these varieties have short styles with which the pollen can come readily into contact. Varieties with protruding styles, such as Coreless, Farquhar, Bountiful, Early Freedom, and Comet were greatly benefited by hand pollination. One test was made of the jarring method of pollination and resulted in a very fair crop.

177—The Pre-Determining Influence of the Physiological Conditions of the Seed Upon the Course of Subsequent Growth and Upon the Yield.—KIDD, F., and WEST, C., in *The Annals of Applied Biology*, Vol. V, No. 2, pp. 112-142. Cambridge, October, 1918.

As a continuation of their study of this question and as a sequel of their work on

the effects of soaking plants in water, the authors publish a review of literature on this subject, the examination of which leads to the following conclusions:—

The effect of parental conditions on the subsequent development of the plant may be considerable. The environmental conditions affecting the seed on the parent plant may be divided into two classes:

(1) *The environment of the seed itself*, i.e. its position on the parent plant. This condition affects chiefly the size of the seed and is independent of external conditions. Larger seeds appear to give more vigorous plants and a better yield.

(2) *The environment of the parent plant*.—Here again differences in size are the only visible effects in the seed itself, but there is evidence that environmental conditions affecting the parents may also have a marked influence on the subsequent course of development of the seed produced. Effects which become visible in one generation may be attributable to external conditions which affected a previous generation.

The question of the pre-determining effect of parental conditions is much complicated by the possibility of heredity factors being concerned, and the facts have so far usually been considered entirely from a point of view of heredity. These difficulties in the interpretation of results disappear when the later effect on the seed of the other conditions, such as harvesting, storage, and germination, are considered. The authors intend to deal with these points in a subsequent paper.

Field Root and Vegetable Seed Growing in Sweden, With Special Reference to the Possibilities of Conducting It on a Scale Commensurable With the Demands of the Country.—WITTE, H., in *Kungl. Landbruks-Akademiens Handlingar och Tidskrift*, Vol. 56, No. 2, pp. 115-149, Stockholm, 1917. Summarized from the Swedish by M. O. MALTE, Ph. D., Dominion Agrostologist.

Root Seed Production in General.—Turnips, have been grown in Sweden from time immemorial which, for instance, is substantiated by the fact that, as far back as seven hundred years ago, the old provincial laws provided penalties for stealing turnips from the fields. The yellow-fleshed turnip which, in a number of varieties, is now grown practically to the exclusion of other turnip types in Canada, is, as is well known, generally called "Swede Turnip", or even simply "Swede." Sometimes it is called "Routabaga", or "Rutabaga", a name which still exists in provincial dialects of Central Sweden under the form "Rotabaggar". The different varieties of "Swedes" have all been developed from the so-called "Gothland Turnip", mentioned by Bartholinus in 1677 in a paper entitled "De Napo Gothlandico". This turnip was introduced into England in 1777 by a gentleman named Airth living in Gothenburg, and curiously

enough, the development, improvement, and seed production, of the "Swedes", have since been closely associated with English and Scottish centres of production. Suffice to mention, that, although the yellow-fleshed turnip is of Swedish origin, the import of Swede seed to Sweden from Scotland amounted, more than fifty years ago, to some 150,000 lb. annually.

Sugar beets and mangels began to be grown generally in Sweden about one-hundred years ago.

At present the acreage devoted to field roots amounts to about a quarter of a million acres.

Concerning root seed growing in Sweden it is, in view of what has just been said about root growing being established for centuries, not astonishing that seed production has for ages been practised.

As far back as 1775, instructions were issued on how to grow turnip seed in general, and, in 1829, production of Swede turnip seed was experimentally undertaken at the Experimental Station of the Royal Academy of Agriculture at Stockholm. It was only around 1880, however, that root seed growing was taken up in earnest from the standpoint of a national farming industry and placed on a footing calling for what, at that time, were considered scientifically speaking most rational principles. Seed growers' associations were formed in various provinces and seed houses began to undertake root seed growing on a comparatively large scale. Although of importance from a historical point of view this seed production movement yielded only scant results, the chief reason being that, at that time, the principles governing plant breeding were very hazily understood.

At that time, however, (1880) root seed growing began to be looked upon as an industry of a truly national importance in Denmark. The efforts of the Danes to develop root seed growing naturally influenced the Swedish concerns engaged in the business and, as a result, the interest in root seed growing was greatly stimulated in Sweden, especially in the Southern parts of the country.

At present (1917), it is estimated that the following quantities of field root seed are produced annually in Sweden.

Fall Turnips.....	175,000 lb.
Swede Turnips.....	45,000 "
Mangels.....	225,000 "
Carrots.....	25,000 "
Sugar Beets.....	450,000 "

Root Seed Growing on a Sound Basis.—In the opening sentence to this chapter Dr. Witte says:—"Rationally undertaken root seed growing must be conducted in such a manner that the seed produced is of a quality assuring farmers buying it of the highest possible root yields. Otherwise, root seed growing on a large scale can hardly be called justifiable."

Elucidating this statement he continues:

"As is well known, there exist among the different kinds of roots a number of varieties different as to appearance, soil and climate requirements, and usage. In each of the varieties, there exist a number of strains. All the strains of a certain variety may, as far as can be judged from their outward appearance, look alike, but they may be essentially different in respect to yielding capacity and dry-matter content. In addition, it is necessary that a strain, in order to retain its good qualities, shall be subjected to continued selection.

The production of so-called stock seed is based on these facts and, in the production of stock-seed, only those roots which represent the type of the strain and, at the same time, are capable of producing the largest possible yields of the highest possible dry-matter content, are selected and planted for stock seed production.

As particular carefulness and considerable costs are associated with the production of stock seed, it follows that it generally can be produced only in small quantities.

The stock seed obtained is used for the production of commercial seed. All Root Seed Growing must be founded on the use of genuine Stock Seed and, at that, of stock seed representing the very best strains. If not, there is a very grave danger of seed of a decidedly inferior quality being produced."

In Denmark, where the breeding of roots is advanced probably more than in any other country in the world, a great number of excellent strains have been developed. Individual farmers have for a long time been selecting with a view of developing superior strains. In many cases the selection has been extremely well undertaken, but not in others. As a result, both good and bad strains of the same variety have been brought on the market. In order to eliminate the poorer strains, the Danish Agricultural Experimental System started so-called "strain trials" in 1900. All growers producing at least a ton of root seed are entitled to participate in the trials, which are conducted on the Government Experimental Stations. All strains of a variety are classified according to dry-matter yield per acre, and only the names of the strains which are found A1 are being published. The trials have been going on since 1901, with the result that the farmers of Denmark are realizing how important it is to use root seed of a really first class quality, and also how un-economical it is to use seed of an unknown pedigree offered at a cheaper price. As a result of the trials, the less valuable strains have gradually disappeared from the Danish market.

Whereas, in Denmark, the development of new strains of superior quality is due, in a large measure, to efforts of individual farmer-growers, new strains in Sweden have, with few exceptions, so far been produced by a few large Plant Breeding concerns. These do not sell the stock seed but either multiply

it themselves or place it with farmers, under contract, for commercial reproduction on the scale which the demand for the various varieties calls for. Lately some individual farmers have taken up the production of stock seed which they are using themselves for production of commercial seed. There are also a number of farmers who have undertaken to produce root seed from ordinary commercial seed but, as experience has shown that such seed is often of a rather low agricultural value, the practice is being discouraged.

Both Sweden and Denmark realize that, in order to maintain a high standard in the matter of root yields, it is absolutely necessary that the seed growers understand thoroughly of what paramount importance it is to use genuine stock seed for commercial reproduction.

Yields and Cost of Production.—During the years 1910-1915, the average yields of field root seed in Southern Sweden has been as follows:—

Fall Turnips.....	about 1,200 lb. per acre.
Swede Turnips...	" 1,150 " "
Mangels.....	" 1,550 " "
Carrots.....	" 700 " "

For the period 1909-1915, the average yield of sugar beet seed has been as follows:—

In Southern Sweden.	about 1,900 lb. per acre
" Central Sweden..	" 1,450 " " "

To give an idea of what yields can be realized under favourable soil and weather conditions, it may be mentioned that one farmer in Southern Sweden raised in 1910, on 20 acres, an average of over 1,800 lb. of fall turnip seed per acre. Another one produced in 1911, on about 5 acres, an average of about 2,500 lb. of Swede seed per acre. Some 2,200 lb. of mangel seed are frequently raised per acre, even on areas amounting to 15-20 acres. The highest carrot seed yield on record for a field of at least 10 acres amounts to not less than 1,200 lb. per acre. In 1913, a 225-acre field of sugar beets yielded about 2,650 lb. of seed to the acre, and smaller mangel seed fields have yielded as much as 3,500 lb. to the acre.

The yield largely depends on the condition of the soil and, as a rule artificial fertilizers are used in large quantities together with barnyard manure. It is thus recommended that, in the case of Fall and Swede Turnips, some 275 lb. superphosphate and some 175 lb. of nitrate of soda be applied per acre to the stecklings crop, and that some 250 lb. per acre of nitrate of soda be applied to the seed crop. For mangels, it is recommended that the seed fields be given, besides a liberal application of barnyard manure, about 300 lb. of superphosphate, 250 lb. of nitrate of soda, and 90 lb. of potash to the acre.

The cost of production of course varies with the yields obtained.

It is estimated that the cost of production of a pound of root seed was, before the war:

Turnip Seed from Stecklings:—

With a yield of 900 lb. per acre, about 8 cents.

With a yield of 1,300 lb. per acre, about 6 cents.

With a yield of 1,800 lb. per acre, about 4.5 cents.

Turnip Seed from large roots.—

With a yield of 700 lb. per acre, about 11 cents.

With a yield of 900 lb. per acre, about 9 cents.

With a yield of 1,150 lb. per acre, about 7 cents.

Mangel Seed from large roots.—

With a yield of 900 lb. per acre, about 10.5 cents.

With a yield of 1,300 lb. per acre, about 7 cents.

With a yield of 1,600 lb. per acre, about 6 cents.

With a yield of 1,800 lb. per acre, about 5 cents.

Carrot Seed.—

With a yield of 4-500 lb. per acre, about 11-14 cents.

The author expresses the opinion that, even with medium yields and medium prices, root seed growing can be made a profitable business in at least the Southern parts of Sweden.

Vegetable Seed Growing.—Vegetable seed growing has, up to very recently, been of very little importance in Sweden. It is true that experiments in vegetable seed growing were conducted almost a hundred years ago, and that about forty years ago a seed grower's association in Central Sweden started some seed growing of cabbage, table beets, parsnips, etc., but the industry attained no general importance until 1916.

That year the Food Control Commissioner arranged to establish a "Seed Bureau" which was instructed to work for the production of such quantities of vegetable seed as were needed in the country.

On account of difficulties in securing sufficient quantities of first class seed to start with, the area which the Seed Bureau planted was not as large as it was planned to be. A total of about 300 acres were however planted. The seed yields obtained were comparatively small on account of very unfavourable weather conditions. For the 1917 seeding there were at least 200,000 pounds available of garden peas and beans, spinach, lettuce and radishes.

Vegetable seed growing being a very young industry in Sweden, it is difficult to estimate what average seed yields may be counted on. During 1911-1915 the average yield of brown beans, the most popular variety in Sweden, was about 1,650 lb. to the acre, with a minimum of about 700 lb. and a maximum of about 3,520 lb.

The average yield of spinach seed was during 1913-1915, a little over 1,300 lb per acre. Of radish seed, it is estimated that

an average yield of from 700 to 900 lb. per acre may be counted on. Table carrots are estimated to yield on the average some 350-450 lb. per acre, and parsnips some 1,050-1,250 lb. per acre. The average of table beets is estimated at 1,050-1,300 lb. per acre, and parsley yields of 900 lb. per acre have been realized. The highest onion seed yield so far on record is 530 lb. per acre.

One section of Dr. Witte's lengthy article contains special information and recommendations for field root seed growing and vegetable seed growing.

An Improved Method of Potato Seed Treatment—MELHUS, I. E., and GILMAN, J. C., in Iowa Experiment Station Circular 57, pp. 8. Ames, Iowa, 1919.

A modification of the formaldehyde treatment for seed potatoes is described whereby the tubers are immersed for two minutes in a solution of 2 pints of formaldehyde to 30 gallons of water maintained at a temperature of from 118 to 122°F. The hot solution is said to have had no deleterious effect upon germination, as indicated by the tests made during the past three years.

179—The Temperatures of Small Fruits When Picked—STEVENS, N. E., and WILCOX, R. B., in *The Plant World*, Vol. XXI, No. 7, pp. 176-183. Tuscon, Arizona, July 1918.

It has been known for more than a century that certain parts of plants may reach a temperature much above that of the atmosphere. Current literature does not, however, seem to contain any reference to the fact, easy to observe, that small fruit on clear days attain a temperature much higher than that of the air; this is probably due to isolation. The author noticed this for the first time in cranberries (*Vaccinium macrocarpon*) during the autumn of 1916. During the following year they compared the temperature of various small fruit with that of the atmosphere at the time of picking. Besides their botanical interest the data obtained are also of practical interest with respect to the decay of the fruit during transport and on the market.

It was shown that small fruit, especially strawberries, keep better when picked cold rather than warm (i.e. in the afternoon). Already in 1903 Mr. Powell (*Bureau of Plant Industry Bull.* No. 40, 1903) observed that peaches picked and packed towards afternoon are warmer and reach the market in less good condition than fruit picked in the morning, though he did not note that, towards midday the temperature of the fruit is above that of the air. The authors collected fruit, put it in a quart basket and placed a thermometer in the fruit mass, near the centre of the basket. The temperature thus observed was that of the outside surface of the fruit and the air circulating amongst it. The temperature was read

at intervals of one hour from 6 a.m. to 7 p.m. The greatest difference found between the temperature of the air and that of the fruit was: strawberries, 9.5°C. at midday; green gooseberries, 4.5° to 10 a.m.; currants 8.5° at midday; blueberries 9° at midday; cranberries, 6.5° at 10 a.m.

In another series of investigations with strawberries the external and internal temperatures of the fruit (measured by inserting a thermometer) were compared with that of the air. It has been shown that, in such cases, the rise in temperature may be caused by wounds, but Mr. Richards proved this increase to vary from 0.2 to 1.2°C., negligible features in comparison with the figures found by the authors. These were, at 10 a.m. and 2 p.m. respectively:—air temperature, 25° and 29°; temperature of strawberries in boxes, 29.5° to 35°; internal temperatures of strawberries, in the shade, 29° to 34.5°C., in the sun, 38° to 42° and 39 to 43.5°C., according to the exposure.

The rise in temperature of the fruit is chiefly due to the absorption of radiant energy. As a rule the difference between the temperature of the fruit and that of the air was greatest when the sun was highest, lowest in the morning and afternoon, and practically nil at night and on cloudy days.

LIVE STOCK AND BREEDING

218—Contagious Abortion of Cattle—*Agricultural Experiment Station, Kansas State Agricultural College Circular* No. 69, 16 pp. Manhattan, August, 1918.

This circular, published in collaboration with the Extension Division of the Kansas State Agricultural College and the Departments of Veterinary Medicine, Animal Husbandry and Dairy Husbandry of the College, gives the best scientific and practical information available on contagious abortion. Contagious abortion due to a specific micro-organism, causes not only the death of the foetus and abortion, but retained afterbirth, and subsequent barrenness. It is spread in the herd by the bull, and by infection of the foodstuff, and from herd to herd by the purchase of diseased cattle. No cure is known. Drugs, such as carbolic acid and methylene blue have proved useless, and vaccines are still in the experimental stage. The disease may be controlled by proper management of the herds, based on three principles:—(1) prevention of the spread of the disease; (2) development of herd immunity; (3) treatment of affected animals aiming at recovery and the preservation of reproductive function. In the last case a veterinary surgeon should be called in. Abortion is a self-limiting disease which dies out of itself if the herd is kept intact.

Valuable breeding animals should never be sacrificed on account of this disease; aborting cows should be treated, and normal calves raised to replenish the herd.

The Utilization of Irrigated Field Crops for Hog Pasturing.—FARRELL, F. D., in *United States Department of Agriculture Bulletin* 752, pp. 37. Washington, D.C., 1919.

This bulletin reviews 149 tests with hogs on irrigated pastures, involving a total of 3,795 animals, conducted by the Bureau of Plant Industry on various western reclamation projects. Most of these tests were made during the years indicated at experimental farms on (1) the North Platte project at Scottsbluff, Nebraska, (1913-1916); The Huntley, Mont., project (1913-1916); The Belle Fourche, S. Dak. project (1914-1916); and (4) the Truckee-Carson project (1915-1918). Less comprehensive experiments at the experimental farms of the Umatilla, Oreg. and Yuma, Ariz. projects are also reported. Practically all the tests conducted on the experimental farms have been previously noted from the annual reports of each farm and a summary of the Scottsbluff results through 1915 has been published separately. Additional details of the tests are given in the present compilation and in some cases different and presumably, revised data. The other tests summarized were conducted in co-operation with farmers located on the North Platte, Tieton, Uncompahgre, Boise, and Minidoka projects.

Pasturing alfalfa without supplementary feed seldom proved satisfactory. Hogs on alfalfa pasture with a 2 per cent grain ration produced about 2,500 lbs. of pork per acre in a season and consumed from 2.5 to 3 lbs. of grain per pound of gain.

The feeding values of corn, barley, shorts, and milo (maize) as supplements to alfalfa pasture differ from one another so little that the choice among these supplements should depend on prices, cultural adaptability, and general economic conditions. When the grain supplement is to be produced by the swine grower, preference usually should be given to corn, barley, and the grain sorghums depending on the adaptability of each of these crops to local conditions in each instance.

An acre of good alfalfa supplemented with as much as a 2 per cent ration of grain has an average hog-carrying capacity of about 2,500 lbs. of live weight for the growing season. Carrying capacity increases rapidly with increased grain allowance, and it varies somewhat during the growing season with the rate of crop growth.

An acre of good alfalfa pasture, if supplemented with a 2 per cent ration of corn or barley, will support 6 to 8 sows and 50 to 70 suckling spring pigs for a period of about 60 days in early summer, during which time the pigs should gain 25 to 30 lbs. each. At the close of this period the pigs should be ready to go into alfalfa pasture by themselves for the remainder of the growing season. The few tests so far conducted indicate that white sweet clover is not to be regarded as a rival of alfalfa as hog pasture.

The gains made in the tests of hogging corn reported in this bulletin ranged from 183 to 1,048 lbs. per acre of corn when no supplementary feed was given and from 335 to 1,377 lbs. per acre when the corn was supplemented. It is estimated that in these tests an average of about 450 lbs. of corn was required to produce 100 lbs. of gain when no supplement was used, as compared with an average of 409 lbs. when the corn was supplemented with tankage, late alfalfa pasture, or rape. Alfalfa pasture is to be preferred as a supplement to corn in hogging off enterprises on irrigated lands because of its cheapness and reliability.

The tests reported show that field peas have a high value as an irrigated crop to be hogged off. The gains in live weight per acre of peas in 17 tests ranged from 250 to 949 lbs. averaging in the neighbourhood of 600 lbs. These results compare not unfavourably with those obtained by hogging corn, when the costs of production of these crops are considered.

232—Feeding Fowls With Wheat Treated With Copper Mixture; Experiments in New South Wales, Australia.—*The Agricultural Gazette of New South Wales*, Vol. XXIX, Pt. 9, p. 667. Sydney, September 1918.

As farmers do not always sow all their sulphate-treated seed it is of interest to know whether it may be fed safely to hens. With this end in view the agricultural Department of New South Wales made a series of experiments at Hawkes Agricultural College. Twelve Rhode Island Red hens were divided into three lots, each receiving their normal food in the morning. In the evening Lot 1 was given wheat which had first been soaked in a 1.5% copper sulphate solution, then in lime (according to the formula proposed by the Department of Agriculture), Lot 2 wheat soaked in 1.5% copper sulphate solution only, and Lot 3 a mixture of $\frac{1}{3}$ wheat grain and $\frac{2}{3}$ maize.

Results.—(1) The treated grain was always eaten immediately by Lots 1 and 2; (2) the three lots ate equal amounts of grain daily; (3) from June 17, 1917, to February 28, 1918, the three lots produced 997, 976, and 939 eggs respectively; (4) the eggs were normal in size, shape and appearance; (5) the health of the hens was always good; no change was observed in the excreta as a result of the continued use of copper sulphate.

A post mortem examination was made of some of the hens of the first two lots. Externally there were no signs of any injurious effect exercised by the sulphate-treated grain, but in a few cases there was a marked effect on the liver and a slight effect on the intestines. This shows that the continued use of copper sulphate, even in small quantities, may have bad results; moreover, the action of copper sulphate is known to be accumulative.

Conclusions.—When it is essential to avoid all waste, sulphate-treated grain may be fed to hens without danger on condition that they form a small part of the ration only and are not used for more than a few months.

257—Preserving Fodder by Selected Ferments; Investigations in Italy.—CORINI, C., in *Le Stazioni sperimentali agrarie*, Vol. LI, Pt. 3-6, pp. 199-213. Modena, 1918.

A series of investigations outside Italy having confirmed the author's theory on the utilization of selected ferments in ensilage (1907) he has made a summary of the discussions and investigations on ensilage, including his own studies, which he summarizes as follows:—

These studies were begun in 1904 during the scientific debate between those holding the bacterial theory and those holding the physiological or autolytic theory of the transformation factors occurring during ensilage. Leaving aside the theoretical aspect of the problem, the studies showed:—

(1) Bacterial intervention, considered not indispensable by some, is constant and unavoidable in practice.

(2) Successful ensilage is closely connected with the bacterial conditions of the silo.

(3) Consequently, bacterial intervention cannot be considered negligible (as in the case of the autolytic theory), and may be advantageous or injurious according to the nature of the predominating bacterial flora.

(4) The bacterial flora of normal silos is comparable to that of cheese and, taking the nature of the predominating bacterial flora as a basis, silos may be classed as *lactic* or *butyric* rather than *sweet* or *acid*, as they differ far more in their volatile acid content than in their degree of acidity.

(5) Preference should be given to the lactic silo from the point of view of economics, the cheese industry, and hygiene, as well as from that of cattle feeding and the milk supply, especially for children and invalids.

These results give a new turn to the preparation of ensilage, reducing it to a process of preservation by lactic fermentation, such as frequently occurs in nature. In ensilage, therefore, it is necessary that the lactic bacterial flora should predominate as rapidly as possible. This is not always easy and depends on many complex conditions the realization of which is inhibited by many natural causes (variations in weather conditions, quality of the fodder, etc.) or technical causes (construction of the silo, method of filling and compression, etc.); it depends above all on the presence of lactic ferments sufficiently numerous and virulent to predominate rapidly over antagonistic bacteria. Maize, for example, is very suitable for ensilage because it is the material richest in lactic ferments; herbaceous material is less suitable because it is often relatively poor

in lactic ferments. Silos insufficiently or over heated are the most dangerous because too low a temperature does not favour the development of the lactic ferments and too high a temperature prevents the development.

To make up for the shortage of the necessary bacterial flora due to defective natural or technical conditions favouring spontaneous lactic fermentation, the proposed addition of selected ferments is useful and often necessary, hastening the fermentation process and greatly attenuating the difficulties described, especially that arising from the degree of heating of the ensilage. Strong lactic ferments allow the ensilage to reach a fairly high temperature (about 50°C.), even though it be for a short time only, thus causing a more active and a purer lactic fermentation, free from volatile and secondary products.

These theories are confirmed by numerous works published outside Italy, and agree perfectly with the accepted eclectic autolytic-bacterial doctrine. Moreover, the use of selected ferments is also in accordance with pure autolytic theory. Even when bacterial life is considered to be excluded it still exists inevitably and the use of ferments helps greatly, by the strong acidification caused, to remove all other bacterial activity. If maize silage, on which the physiological theory is based gives results at all temperatures, it is because it lends itself best to rapid lactic fermentation caused by the numerous lactic bacteria present.

The results obtained by the author and other workers seem to show the work to be sufficiently advanced to prove the value of selected ferments in ensilage to be equal to that assigned them in cheese-making. The present shortage of fodder makes it necessary to utilize everything of value as a food by easy and cheap methods of preservation at all seasons. The author, therefore, proposes without giving up systematic experiments that an abundant distribution of selected ferments should be distributed among the travelling chairs of agriculture and farmers. All necessary precautions must, of course, be observed, instructions given as to the best methods of using the ferments, and the bacteriological and chemical control necessary to assure the best results exercised. This would prove a good, simple and practical method of propaganda for ensilage, as the method requires no special installation nor rigorous rules as to the temperature of fermentation which may vary within fairly wide limits (from 30 to 50°C.). Whatever the transformation factors of silaged fodder may be, the addition of lactic ferments will in all cases perfect the process, giving economic and hygienic advantages to animal production, the cheese industry, and the milk supply.

FARM ENGINEERING.

240—The Estimation of the Work of a Power Farming Machine.—RINGELMANN, M., in the *Bulletin de la Société d'Encourage-*

ment pour l'Industrie Nationale, Year LXVII, Vol. CXXX, No. 5, pp. 281-283. Paris, September-October, 1918.

The author gives an approximate solution of the following problem:—When the test of a power-farming machine lasts 10 to 30 minutes, how can the work that can be carried out under practical conditions be estimated, only considering the measure relating to the speed during the work?

Let l be the width worked by the machine in metres, c the distance travelled in metres per hour while the machine is working (ploughing, etc.).

If there were no time lost the surface S worked per hour would be, in sq. metres, equal to lc . But, given that about the same time is lost in turning, the product lc should be multiplied by a first reduction coefficient m varying from 0.86 to 0.77 for an average furrow length of 150 metres; this coefficient diminishes with the speed of progression. The actual work per hour is only 50 minutes, owing to various stoppages in practice, lubricating, inspecting the machinery, which requires a second reduction coefficient of 0.83, so that if K be the final coefficient, the following table will be obtained, K varying with the speed forward during the work:

Speed forward (in metres) during work		Coefficients	
per second	per hour	m	K
0.80	2.880	0.86	0.71
0.90	3.240	0.85	0.70
1.00	3.600	0.83	0.69
1.10	3.960	0.82	0.68
1.20	4.320	0.81	0.67
1.30	4.680	0.79	0.66
1.40	5.040	0.78	0.65
1.50	5.400	0.77	0.64

To sum up, the surface S on which one can reckon in current practice is given by the formula $S = Klc$, where K is the coefficient, shown in the above table, corresponding to the distance c travelled per hour in metres while the machine is working during the test. Thus, in a trial, it was found that, with a width l of 0.90 metres, the machine moves along the furrow at a speed c of 3,240 metres per hour, and the cultivated surface S on which one can reckon will be $S = 0.70 \times 0.90 \times 3,240 = 2,041.2$ sq. metres.

The previous table of the coefficients K can only be used for approximate calculation. If more accuracy is desired, a special calculation must be made for each case under consideration, while taking into account the furrow length and the average time required for turning.

In the case of vines or hoeing drilled crops, the uncultivated portions and the time requir-

ed for turning must be taken into account. The formula $S = Klc$ may be used on adding to l the corresponding portion a of the uncultivated portion, that is, $l + a$ if the space between the drills is worked in a single turn, or, again $l + \frac{a}{2}$ if the space between the drills requires two turns to cultivate it. This is equivalent to substituting for l of the formula the width E between the vines (in metres), if the space between the lines is worked in a single turn, or $\frac{E}{2}$ and $\frac{E}{2}$ if it is cultivated in 2 or 3 turns respectively.

The Farm Tractor.—AITKENHEAD, W., in *Indiana Agricultural Experiment Station Circular* 89, pp. 24. La Fayette, Indiana, 1919.

This circular reports the results of experiences of from 95 to 100 representative tractor users in the State of Indiana, working farms of from 100 to more than 500 acres.

The fuel cost per acre is variable, depending on the type of soil and the general efficiency of the tractor and plow. With gasoline as fuel, the highest cost given was \$1 per acre for ploughing stiff clay 8 to 9 inches deep. The lowest was 50 cents per acre for sandy clay ploughed to a depth between 7 and 8 inches; 60 cents per acre may be taken as the average cost of ploughing 7 inches deep under Indiana conditions. The cost per acre, using kerosene as fuel, is considerably lower. The highest cost given is 50 cents per acre for ploughing clay land with a two-bottom plough, 7 inches deep, and the lowest is 25 cents per acre for loose bottom land ploughed 7 inches deep. The average tractor is using three gallons of kerosene per acre, costing about 12.5 cents per gallon to plough between 7 and 8 inches deep.

Out of 94 tractor owners, 84 reported a saving of two to four horses and 10 no saving in horses due to use of the tractor. The farmers reported, with very few exceptions, that their two or three-plough tractors dispensed with the services of one man and two or three horses.

The almost unanimous preference was for a three-plough size; in fact, with two exceptions, every owner of a two-plough tractor purchased before 1918 intimated that if he bought another tractor, it would be a larger one. Purchasers of the newer 1918 models of two-plough tractors generally expressed themselves as satisfied.

Out of 95 tractor owners 77 expressed themselves as being satisfied with the tractor. 11 were uncertain, and 7 were dissatisfied. Out of 95 owners 48 reported an increase in acreage due to tractor use. Twenty-seven were ploughing 6 to 7 inches deep; 46, 7 to 8 inches deep; 17, 8 to 9 inches deep; and 5 over 9 inches.

Hay Stackers.—McCLURE, H. B., in *United States Department of Agriculture, Farmers' Bulletin* 109, pp. 22. Washington, D.C. 1919.

This describes different types of hay stackers and gives practical information regarding their cost and use.

Stackers are comparatively inexpensive. The most costly types, the overshot and the swing-around, may be bought from \$45 to \$75, and home made types may be made for a few dollars. If the poles are cut on the farm, the homemade tripod or derrick stacker need not cost any more than an ordinary barn-hay fork without the track. The fork and rope from the barn may be used in rigging up such a stacker. The cost of repairs, interest on investment, and replacement charges on stackers depend upon the amount of hay handled per year; the more hay handled per year the less the amount of these charges per ton. A stacker will last from 10 to 12 years under ordinary conditions. The charges for stackers on 27 farms in central Kansas, which stacked an average of only 144 tons of hay per year, amounted to less than 7 cents per ton when the yield was 1 ton per acre. The charges on 32 farms in central Nebraska, when twice this amount, or 300 tons of hay were stacked per year, amounted to 3 cents per ton with a yield of one ton per acre.

RURAL ECONOMICS.

Principles Involved in Fixing the Price of Milk.—PEARSON, F. A., in *Journal of Farm Economics*, Vol. I, No. 3, pp. 89-96. Lancaster, Pa., October 1919.

After a study of the testimony before numerous commissions, articles, discussions, and conversations, it is found that the price of milk should be based upon: (1) supply and demand, (2) price of butter and cheese, (3) price of butter and corn, (4) competitive commodity prices, (5) year ratios of feed and labour.

Supply and Demand.—The so-called "Law of Supply and Demand" has been advocated by most persons acquainted with the milk situation as the best method of determining proper values. One objection to this method of arriving at just prices is that during periods when surplus milk is available, buyers may dictate prices without regard to justice. The same may also be said of farmers' organizations during periods of shortage. Under a system of higgling or bargaining over prices there may be more or less continually periods of shortage and surplus during which the farmers and milk buyers will alternately control prices. Consequently producers protect themselves during periods of low price level by decreased production and consumers protect themselves during periods of high prices by decreased consumption. During periods of low price level the metropolitan press is disinterested, but when milk becomes scarce and farmers demand prices in accordance with the ratio of supply to demand the metropolitan press demands "investigation" which reflects back to the farmer, through

larger decline in consumption than would normally have taken place without agitation.

Under normal conditions consumption does not vary widely from season to season or from year to year except as there is a gradual increase in the population. Owing to the fact that the supply of milk is affected by sunshine, rainfall, prices of feed, and many other factors, the immediate market may be temporarily flooded with milk or a pronounced shortage may exist which will materially affect prices while the number of cows has not materially changed. The maintenance of the proper number of cows in the country is more important than an excess or shortage in the immediate supply.

Butter and Cheese as a Basis of Milk Prices.

—Milk for direct and indirect consumption is produced by the same animal, the dairy cow, but many people do not properly distinguish between the two classes of products. One group, milk for direct consumption, is both bulky and perishable and consequently must be produced approximately as consumed. Milk utilized for indirect consumption in the form of butter and cheese is converted into a relatively non-bulky or non-perishable product which is most economically handled when largely produced in the summer months and stored for winter use. High winter grain costs play little or no part in butter prices, but they are the paramount factor in milk prices. Winter butter prices are normally the summer butter prices plus storage charge. Summer milk prices are approximately summer butter prices, but winter milk prices bear little or no relation to butter. Winter milk prices are more a question of feed. Any system that puts milk prices on a butter basis puts a premium on summer milk and does not take due cognizance of winter feeding conditions.

Competitive Commodity Price.—The feed and pastures utilized in the production of urban milk can be used in the production of beef, mutton, and to a limited extent the production of pork. Obviously milk prices must follow the price of competitive commodities, otherwise production will be restricted. Down the ages farmers have had but one method of telling what the public wanted, namely, through price. If wool is high in price and hogs are relatively low business acumen advised farmers that the public wanted more wool and less pork. Although farmers have been advised by well-intending but uninformed individuals to raise more of this and less of that, farmers have been and will continue to be patriotic by following the dictates of the past and produce the commodity that pays best. Consequently, assuming a constant volume of milk is desired, any price system based upon the price of competitive commodities will operate without much injustice to buyers and sellers. Any system of price fixing which does not take proper cognizance of the principles of competitive commodity prices is doomed to failure.

Milk Production Costs.—MISNER, E. G., in *Journal of Farm Economics*, Vol. I, No. 3, pp. 97-101. Lancaster, Pa. October, 1919.

The extreme rise in prices during the Civil War period was due chiefly to the fact that they were calculated in inflated paper currency. Similarly, the high prices now are due chiefly to an increased supply of money. Prices of dairy products are high primarily because money is relatively more plentiful than before the war, and not primarily because dairymen or dealers have over-organized, or have become less efficient, or have profiteered; as many persons who use milk and butter are unfortunately led to believe. Feed, labour and cows are high-priced for the same reason. Index figures show that these things, which are the major costs in the dairy business, have increased as much as the prices paid producers for milk and butter. There is no reason for consumers to fear that lately the farmer has been receiving double the former price for milk produced at costs as low as heretofore. Of course much of the labour in producing milk is by the farmer and his family. But, to be as well-off as before the war they should now receive twice as much per hour as formerly, because money is worth only half as much.

During the past summer the writer obtained cost of milk production records in Herkimer County, New York, for the year ending May 1, 1919. Herkimer County formerly was a large centre of cheese production, but now some of the milk is shipped to New York City, and most the remainder condensed, although some cheese is still made during the surplus period. The tendency is to shift to a more intensive type of dairying. A statement of costs for 40

farms appears in Table I. These farmers averaged 142 acres, 70 of which were in pasture land held at an average value of \$41 per acre. There were 21.5 cows per farm with an average value of \$132 per head. Production per cow was 4,808 pounds of which 33 per cent was produced during the six winter months October to March. The average yield and the season of production as well as the amount of grain used per cow indicate the leaning toward the summer system.

Table 1.—Cost of producing milk—Herkimer county farms, year ending May 1, 1919.

Number of farms.....	40
Number of cows.....	860
Acres per farm.....	142
Acres of pasture per farm.....	70
Acres of pasture per cow and accompanying stock.....	3.24
Value of pasture land per acre.....	\$41.00
Cows per farm.....	21.5
Milk produced, cwt.....	41,346
Milk produced per cow, pounds.....	4,808
Milk sold, cwt.....	38,457
Milk sold per cow, pounds.....	4,472
Percent of milk produced April—	
September.....	67
October-March.....	33
Average value of cows.....	\$132.00
Value of grain per ton.....	61.28
Value of silage per ton.....	7.00
Value of dry forage per ton.....	17.84
Value of manure per ton.....	2.63
Average human labour rate, 32.4 cents. per hour.	
Average horse labour rate, 19.6 cents per hour.	
Cost of milk per 100 pounds.....	3.70
Average price received per 100 lbs....	2.97
Loss per 100 pounds.....	0.73

	Amount		Value	
	Total	Per Cow	Total	Per Cow
Charges:				
Grain and other concentrates.....	833,000 lbs.	969 lbs.	\$25,526	\$29.68
Silage and other succulent feed.....	1,340.9 tons	3,118 lbs.	9,034	10.51
Hay and other dry forage.....	2,127.4 tons	4,947 lbs.	37,951	44.13
Pasture.....			9,304	10.82
Bedding.....			928	1.82
Human labour.....	165,287 hrs.	192 hrs.	53,495	62.20
Horse labour.....	37,868 hrs.	44 hrs.	7,406	8.61
Use of buildings.....			5,011	5.83
Use of equipment.....			1,808	2.10
Depreciation on cows.....			7,652	8.90
Interest on cows.....	\$113,735 value		6,824	7.94
Interest on feed and supplies.....			1,460	1.70
Bull service.....			3,246	3.77
Miscellaneous.....			3,778	4.39
Total charges.....			\$173,423	\$201.66
Credits:				
Milk and its products used on the farm and milk products sold.....			\$ 9,421	\$ 10.96
Calves and calf hides.....			4,025	4.68
Manure.....	6,597 tons	7.67 tons	17,350	20.17
Miscellaneous.....			330	0.38
Total returns except milk sold wholesale.....			\$ 31,126	\$ 36.19
Difference cost of milk sold and delivered at station.....			142,297	165.47
Milk sold wholesale.....	38,457		114,284	132.89
Loss on milk sold wholesale.....			\$ 28,013	\$ 32.58

TABLE 2.—COMPARISON BY REGIONS OF FACTORS FOR STUDYING THE DAIRY ENTERPRISE.

State..... County..... Year ending..... City for which milk was produced.....	New York, Herkimer, May 1, 1919 New York and Herkimer	New York, Broome, May 1, 1915 New York and Binghamton (Summer Dairies)	New York, Broome, May 1, 1915 New York and Binghamton (Winter Dairies)	Investiga- tions in Michigan, New York, Connecticut and New Jersey
Number of farms.....	40	41	56	444
Number of cows.....	860	503	798	8,810
Size of business:				
1. Number of cows per farm.....	21.5	12.3	14.2	19.8
2. Hundredweight of milk produced per farm.....	1,034	645	830	1,283
Labour:				
3. Hours of human labour in milk hauling per cow..	192	23	16	195.8
4. Hours of other human labour per cow.....		163	183	
5. Total human hours per hundred pounds of milk produced:				
Pasture period.....		2.44	2.84	
Winter period.....		5.16	3.77	
Year.....	4.00	3.54	3.42	3.02
6. Hours of horse labour per cow.....	44	39.1	29.8	45.3
Season of production:				
7. Percent of milk produced in six months:				
April-September.....	67	71	48	50.3
October-March.....	33	29	52	49.7
Production:				
8. Pounds of milk produced per cow.....	4,808	5,255	5,822	6,481
9. Test of milk.....		4.1	4.0	3.8
10. Pounds of butterfat produced per cow.....		215	234	244
Feeding per 100 pounds of milk in year:				
11. Grain and other concentrates.....	20.2	21.7	28.6	33.79
12. Silage.....	64.9	24.1	96.1	92.2
13. Other succulent feed.....		13.9	14.7	8.3
14. Hay.....	102.9	67.2	62.3	43.3
15. Other dry forage.....		17.2	11.0	10.8
Feeding per 100 pounds of milk in winter:				
16. Grain and other concentrates.....		47.5	42.6	
17. Silage.....		59.9	151.9	
18. Other succulent feed.....		10.3	10.2	
19. Dry forage.....		209.1	118.5	
Per cent of total net cost of milk represented by grain succulent feed, dry forage and human labour.....	83.1	78.6	84.9	79.7

*Data for all regions except Broome and Herkimer counties, N.Y., were taken from The Production, Distribution, and Food Value of Milk, a report to Herbert C. Hoover by the Milk Committee of the U.S. Food Administration. Data for Broome and Herkimer counties were obtained by the Department of Farm Management of the New York State College of Agriculture.

Grain cost \$61.28 per ton, silage was valued at \$7 per ton; dry forage at \$17.84, and manure at \$2.63 per ton. The wages asked by the dairymen averaged 32.4 cents per hour for human time and 19.6 cents per hour for horse time. These are not fancy wages, when drivers of milk wagons in New York City are asking \$47 a week. And yet these producers received not 32.4 cents, but instead 15.4 cents per hour of human time after all other costs were met. It is not difficult to see why mechanical milkers or other investments requiring savings are not introduced more rapidly on dairy farms.

How the important factors concerning size of business, labour, season of production, production and feeding for this region compare with other regions is shown in Table 2.

These dairymen have slightly larger businesses than the average dairymen—larger farms, more cows per farm, more cans of milk sold in a year. The labour requirements are about average per cow. One third of the milk is produced in winter, two thirds in summer. Some herds produce

three times as much in summer as in winter, others about equal amounts in the two periods. Liberal allowances of hay were used, partly because of the high price of grain, although the common practice is to use less than the average amount of grain. Previous studies have indicated that this extensive system is the cheapest way to produce milk, but in this study only eight farms out of forty, or 20 per cent., showed a profit on cows. The average loss was \$33 per cow.

In calculating costs farm-grown feed was charged at its selling value on the farm. Time of the farmer and his family was included at the estimated farm wages necessary to secure other equally efficient to do the work. Hired labour was charged at cost. Interest has been included on the investment in cows and in feed and supplies held for them at six per cent., and on buildings pasture land, and equipment at five per cent. A common question that arises whenever results of cost studies are stated is, that if the actual loss is equal to the apparent loss, how do such producers remain in business. The answer is that they do one

or more of the following things: (1) accept lower wages than the rate at which their time is charged, (2) accept less than farm value for roughage used. (3) accept a lower rate of interest on their investment than the rate charged.

If these farmers received interest on their investment, the farm value of the farm grown roughage and all other costs, they then received 15.4 cents per hour for human labour. —

If they received 32.4 cents per hour for all human labour and interest on their investment, they then received 40 per cent. of the value of hay and other roughage used.

If no interest is charged on the investment in cows or on land, buildings, equipment, feed and supplies used by cows, and if the farmers received 32.4 cents per hour for human labour, they would still receive only approximately 74 per cent. of the market value of hay and other roughage used.

Low rewards for labour on the farm do not encourage the most efficient and energetic to remain. In the past ten years too many farm boys who would have made good farmers have gone into other higher paying industries, because they foresaw what wages they might expect in farming. The results are apparent, many farms operated by men and women of advanced age; many others, for sale. When enough money is allowed to reach producers to reward them as well for time and efficiency as wages paid in other industries requiring equal skill and investment, the business of farming will attract enough of the desirable type of farm boys to properly maintain our agriculture in regions where it is now receding. The pay of farmers should permit them to have modern conveniences for health, education, comfort and transportation. Such conveniences cannot be provided with sufficient rapidity from the savings of low wages, when prices paid for them are based upon labour receiving high wages.

It is too easy to accuse dairymen of inefficiency. The usual methods of attacking dairymen are to condemn his animals and his methods of feeding and caring for them, without any regard for the food he is contributing per dollar invested or per hour of time spent. As producers of animal products, dairymen are highly efficient. For each hour spent in milk production operations on these farms, there were sold for city use 23 pounds, or over 10 quarts of milk. After other costs were met, therefore, the labour reward of these producers was about 1.5 cents per quart. These 10 quarts of milk contained approximately 6,750 calories of energy. It is said that from 3,000 to 3,500 calories daily are needed to support an average man at moderate work. The average contribution to the city food supply for each 10 hours of work in producing milk on these farms was 110 quarts of milk containing as much energy as required by 23 working men for a day. The daily

contribution per farm was as much energy as 26 men require. This must be recognized as efficient business, and calls for none of the adverse criticism that it has received, and will in the future receive, from those whose chief interest is cheap food in the city. The rewards for such contribution should take account of the present and of the more important future necessity of the service.

AGRICULTURAL INDUSTRIES.

Buttermilk Cheese.—RUDNICK, A. W. in *Journal of Dairy Science* Vol. 2 No. 1, pp. 41-45, Baltimore, 1919.

The author, working at the Iowa Experiment Station, finds that a satisfactory cheese can be made from pasteurized sour cream buttermilk by running the heated buttermilk through one of the commercial centrifugal machines now available for the extraction of curd from skim milk in the manufacture of cottage cheese.

The machine consists of a hollow cylinder open at the top except for a rim one-eighth of the diameter, supported by a spindle, and enclosed in an iron frame. The curd lodges under the rim. The casein content of the whey depends upon the acidity, temperature of heating, and duration of heating. When sour pasteurized buttermilk with a casein percentage of 2.69 was held one hour at 170°F. the whey tested 0.266 per cent. When it was held one hour at 140°F. the test was 0.319 per cent. and when heated to 170°F. but not held 0.397 per cent. The curd had the best grain after the buttermilk was held for one hour at 140°. Sour pasteurized buttermilk cheese prepared by the centrifugal method does not have the disagreeable taste resulting from the customary method of neutralization with sodium hydroxid and reacidulation with hydrochloric acid.

It is stated that the centrifugal machine will leave only 0.15 per cent of casein in the whey when buttermilk from pasteurized sweet cream is used. Such buttermilk held at 95 to 115°F. for an hour after the acidity has reached 0.65 per cent produces a cheese equal to cottage cheese in flavour and texture.

The Value of Honey as a Food.—ANDERSON, J., in *Agricultural Gazette of New South Wales*, Vol. XXX, No. 9, p. 639. Sydney, N.S.W.

When the food value of honey is reduced to figures, we find that a pound section of honey (about 14 oz. net) contains as many calories as twenty eggs. Honey is classed among the carbohydrate foods and is a source of heat and energy. When it is known that honey contains very little cane sugar, and consists mainly of grape sugar and fruit sugar, it will be realized that honey is a pre-digested food directly available for the production of heat and energy. This explains why honey is unsurpassed for the relief of fatigue.

Nitrogenous matter occurs in the form of pollen grains always present as an accidental

mixture, and there is nitrogen also in the albumen supplied by the bees in the elaboration of the honey. It has recently been shown that honey also contains those mysterious substances known as vitamins, in the absence of which an animal will lose weight, although supplied with a food ration that is otherwise adequate.

The Production and Conservation of Fats and Oils in the United States.—BAILEY, H. S. and REUTER B. E., in *United States Department of Agriculture, Bulletin* 769, pp. 48, Washington, D.C., 1919.

This bulletin, which is a contribution from the Oil, Fat, and Wax Laboratory of the Bureau of Chemistry, U.S. Department of Agriculture, and the Fats and Oils Division of the U.S. Food Administration, contains statistics of the domestic production of fats and oils and their importation into and exportation from the United States in the years 1912, 1914, 1916, and 1917, and the monthly production of fats and oils and their derivatives in the United States from January to June, 1918.

The increasing use of vegetable oils is shown by the data presented. While in pre-war years the fat exported was over three times that imported, in 1917 the imports were larger than the exports, the annual importation increasing about 200,000,000 lbs. This increase has been largely in vegetable oils. In 1917 the importation of soy-bean oil was over ten times as great, and that of peanut oil nearly four times as great, as in 1912. In domestic production a similar increase is shown. Including butter, in 1912 the quantity of animal fats produced was approximately twice as great as that of vegetable oils, while in 1917 the production of vegetable oils was over two-thirds that of animal fat. Among the vegetable oils, cottonseed stands at the head of domestic production, with linseed oil next in importance. The quantities of coconut, corn, peanut, and soy-bean oil have increased very rapidly in the last five years.

The statistical data are followed by a brief outline of the processes in use in the United States for the production of fats and oils, and more detailed descriptions of the available supply and methods of production of the important vegetable oils, including cottonseed, olive, peanut, coconut, palm kernel, palm, corn, soy-bean, linseed, and castor oil; animal fats and oils, including lard, tallow, and fish oil; and refuse fats, trade wastes, and fat and oil derivatives. The possibilities are considered of increasing the supplies of these products by developing new sources, improving present methods of manufacture, substituting the more abundant oils for those which are scarce, and conserving for the purposes to which they are practically adapted those oils which can not easily be replaced by others.

PLANT DISEASES.

270—**The Rose-Leaf Hopper, Injurious to Apple Trees in America.**—CHILDS, L., in the *Oregon Agricultural Experiment Station, Bulletin* No. 148, pp. 1-32. Corvallis, Oregon, 1918.

In 1912-1913 the apple orchards of the north-western Pacific States were badly attacked by the rose leaf hopper (*Empoasae*). The attack is limited to the lower surface of the leaves and causes yellow marbling. The insect does not make holes in the fruit but soils it with its excreta.

There are two generations a year. The parasite lives almost exclusively on Rosaceae, showing a marked preference for the rose, which is much damaged by one generation of insects alone. The apple tree and strawberry are the only plants on which the spring and the summer generations have been observed. The insect's predilection for the rose tree helps in its control. By planting bushes or hedges of roses near, or better still, within, the orchard, the female insects lay nearly all their eggs on the stems of these plants, leaving the apple trees free; it is then easy to destroy a great number before spring. For the control of the hopper are advised:

(1) against the first generation, lime-sulphur mixture during the first to third pupal stages.

(2) followed by treatments with concentrated tobacco extract (Black leaf 40) and soap water.

The mixture must be so applied as to reach well the hoppers on the lower surface of the leaves.

INJURIOUS INSECTS.

271—***Halisidota caryae*, a Lepidopteron Injurious to Cultivated Trees in Canada and the United States.**—ISELY DWIGHT, in *U. S. Department of Agriculture, Bureau of Entomology, Bulletin* No. 598, pp. 1-16. Washington, D. C., 1918.

The larvae of *Halisidota caryae* Harris (= *Lophocampa caryae* Harris, 1841, *Halesidota annulifascia* Walker, 1855, *Phegoptera porphyrea* Herrich-Schaffer, 1855, *Halisidota caryae* Harris, Grote, 1822, *Halisidota caryae* [Harris]. Packard, 1890) attack by preference leaves of *Juglans Sieboldiana*, *J. regia*, *J. nigra*, apple and pear trees; *J. cinerea*, *Cydonia oblonga*, *Carya alba* are also often attacked; the insect has also been reported on species of *Acer*, *Aesculus*, *Alnus*, *Betula*, *Carpinus*, *Castanea*, *Celtis*, *Crataegus*, *Fagus*, *Fraxinus*, *Hamamelis*, *Larix*, *Ostrya*, *Platanus*, *Prunus*, *Quercus*, *Salix*, *Rhus*, *Rosa*, *Rubus*, *Tilia*, *Ulmus*.

In North America this insect is found from the Atlantic westwards to the States of Missouri and Minnesota, as far as Saskatchewan, and from the Canadian provinces of Ontario and Manitoba southward to North Carolina and the south of Ohio.

There is only one generation a year. The insect pupates in autumn and passes the

winter in this state. The adults appear at the beginning of the following summer. Laying takes place towards mid-June, the larvae hatching after about a fortnight. The duration of the larval stage varies according to the host; on *J. Sieboldiana* it lasts on an average 74 days, on the pear tree 88, and on the apple tree 92 days.

The only natural enemy of the insect known is *Pimpla pedalis* Cress. As methods of control, in addition to the direct destruction of the eggs and larvae collected on foliage, treatment with lead arseniate towards the end of June, shortly before the hatching of the larvae, may be recommended.

AGRICULTURAL STATISTICS

THE CROPS OF 1919

A cablegram received from the International Institute at Rome gives the following official crop reports:

The total production of wheat in 1919 in Spain, France, Great Britain, Italy, Netherlands, Roumania, Switzerland, Canada, United States, India, Japan and Tunis is 2,040,052,000 bushels, against 2,182,000,000 in the same countries in 1918 and 2,115,000,000 their average annual production in the five years 1913-1917.

The production of Rye in Spain, France, Italy, Netherlands, Roumania, Switzerland, Canada, and the United States is 169,414,000 bushels against 177,000,000 in 1918 and a five years' average of 136,500,000.

The production of barley in Spain, France, Great Britain, Italy, Netherlands, Switzerland, Canada, United States, Roumania, Japan and Tunis is 550,090,000 bushels

against 616,000,000 in 1918 and a five years' average of 540,000,000.

The production of oats in the same countries as for barley is 1,963,095,000 bushels against 2,343,000,000 in 1918 and a five years' average of 2,173,000,000.

The production of corn in Spain, Italy, Roumania, Switzerland, Canada, and the United States is 3,126,194,000 bushels against 2,723,000,000 in 1918 and a five years' average of 2,995,000,000.

The production of potatoes in Scotland, Netherlands, Switzerland, Canada, and the United States is 607,630,000 bushels against 691,000,000 in 1918 and a five years' average of 600,000,000.

The production of flaxseed in Italy, Roumania, Canada, United States, India and Japan is 26,492,000 bushels against 32,300,000 in 1918 and a five years' average of 43,500,000.

UNITED STATES FINAL CROP REPORT 1919

Final figures for the 1919 crops of the United States compared with 1918 and the average of the five year 1913-1917 are as follows:

Crops.	1919	1918	Five years' average 1913-1917
	Bushels	Bushels	Bushels
Wheat.....	941,000,000	917,100,000	790,634,000
Corn.....	2,917,000,000	2,582,814,000	2,749,349,000
Oats.....	1,248,000,000	1,538,359,000	1,331,287,000
Rye.....	88,000,000	90,183,000	50,001,000
Barley.....	166,000,000	256,375,000	199,212,000
Hay.....	Tons 109,000,000	Tons 90,443,000	Tons 96,921,000

THE 1919 CROPS OF ENGLAND AND WALES

Crops.	Area.		Production.		Yield Per Acre.	
	1919	1918	1919	1918	1919	1918
	Acres	Acres	Bushels	Bushels	Bushels	Bushels
Wheat.....	2,221,000	2,557,000	63,832,000	84,240,000	28·7	32·9
Barley.....	1,510,000	1,501,000	45,642,000	50,666,000	29·0	32·4
Oats.....	2,564,000	2,780,000	101,778,000	128,208,000	35·5	41·3
Beans.....	274,000	242,000	6,832,000	7,112,000	24·9	29·4
Peas.....	132,000	128,000	3,704,000	3,688,000	26·7	27·5
Seeds' Hay.....	1,501,000	(a) 1,447,000	Tons 1,770,000	Tons 2,098,000	Cwt. 23·6	Cwt. 29·0
Meadow Hay.....	4,171,000	(b) 4,298,000	3,425,000	4,688,000	16·4	21·8

(a) Hay from clover, sainfoin and grasses under rotation.
(b) Hay from permanent grass.

UNITED STATES WINTER WHEAT REPORT

The United States Department of Agriculture reports the area sown to winter wheat in that country as 38,770,000 acres against the revised estimated area sown in the fall of 1918 of 50,489,000 acres, a decrease of 11,719,000 acres. The condition of the crop on December 1st was 85.2 per cent of normal compared with 98.5 per cent on

December 1st last year and 89.5 the ten year December 1st average.

The area sown to rye is estimated at 5,530,000 acres against 7,232,000 acres, the revised estimated area sown in the fall of 1918. The condition of winter rye on December 1st was 89.8 per cent of normal compared with 89.0 per cent last year, and 91.6 the ten year December 1st average.

CROPS IN ARGENTINA

("The Northwestern Miller", Dec. 10, 1919).

The prospects for the wheat and flaxseed harvests are excellent. Reaping is progressing satisfactorily in the provinces of Santa Fe and Cordoba, and the reports of the yield are favourable.

Foreign shipments are heavy. The quantity of wheat and corn from old stocks still available for export is estimated at 500,000 metric tons of wheat (18,350,000 bushels of

60 lbs.), and 2,000,000 tons of corn (63,000,000 bushels of 70 lbs.)

Congress is still discussing the new grain convention. Official estimates of the areas sown this year to wheat, flaxseed and oats show a considerable reduction from 1918. The estimates are: wheat, 14,957,000 acres; flaxseed, 3,520,000; oats, 2,300,000. These acreages compare with those reported for previous years as follows:

Year.	Wheat	Flaxseed	Oats
1919.....	14,947,000	3,520,000	2,300,000
1918.....	16,976,000	3,621,000	2,969,000
1917.....	17,581,000	3,311,000	2,854,000
1916.....	16,089,000	3,207,000	2,525,000
1915.....	16,419,000	4,060,000	2,565,000
1914.....	15,470,000	4,257,000	2,869,000
1913.....	16,244,000	4,397,000	3,087,000
1912.....	16,971,000	4,312,000	2,940,000
1911.....	17,042,000	4,028,000	2,548,000
1910.....	15,452,000	3,716,000	1,980,000

It is thus apparent that the wheat acreage is the smallest for 10 years, while in only two out of the last 10 years has the flaxseed acreage been smaller, and the oats acreage of 1919 is smaller than any since 1910.

The crops actually produced, however, have by no means always followed closely the proportion of the acreage, as is shown by the following table, which gives the leading crops in thousands of bushels (000's omitted)

Year	Wheat	Corn.	Oats	Flaxseed
1918.....	184,270	.....	41,525	27,755
1917.....	219,431	170,660	75,783	22,480
1916.....	70,224	58,839	31,781	3,996
1915.....	172,629	161,133	75,280	39,289
1914.....	169,166	338,235	49,397	45,040
1913.....	113,904	263,135	50,981	36,928
1912.....	187,391	196,642	75,783	44,486
1911.....	166,190	295,849	69,169	22,534
1910.....	145,981	27,675	47,192	23,424
1909.....	131,010	175,187	36,483	28,212
1908.....	156,000	177,000	58,600	41,291
1907.....	192,489	136,057	33,949	43,333
1906.....	155,993	71,768	12,400	32,502
1905.....	135,000	195,000	3,400	23,000

The following table shows the total wheat, corn, linseed and oats exports from Argentina,

by calendar years, in thousands of bushels, as officially reported:

Year.	Wheat	Corn.	Linseed	Oats
1919*	88,375	61,629	28,830	16,104
1918.....	107,510	20,402	15,642	36,659
1917.....	32,943	28,228	5,607	18,683
1916.....	84,321	113,140	25,192	55,421
1915.....	92,172	173,223	38,658	40,898
1914.....	36,028	139,451	33,131	24,426
1913.....	103,328	189,239	40,026	61,410
1912.....	96,484	190,352	20,290	61,824
1911.....	83,896	4,928	16,369	35,259
1910.....	69,142	104,727	23,812	25,599
1909.....	92,263	89,499	34,928	29,049
1908.....	133,441	67,390	41,558	30,360
1907.....	98,392	50,262	30,066	9,936
1906.....	82,501	106,046	21,199	3,588

*Jan. 1st to October 30, 1919.

Exports of wheat flour from Argentina, by calendar years, are officially estimated

as follows, in barrels of 196 lbs.:

1919*.....	2,686,421	1912.....	1,473,396
1918.....	1,465,632	1911.....	1,327,043
1917.....	1,044,198	1910.....	1,292,570
1916.....	1,386,549	1909.....	1,304,598
1915.....	1,299,749	1908.....	1,271,200
1914.....	754,040	1907.....	1,427,989
1913.....	1,396,069	1906.....	1,444,778

*Jan. 1st to Oct. 30th, 1919.

FOREIGN CROP CONDITIONS

(From Broomhall's cables).

United Kingdom.—After unusually severe frost, the weather turned mild and rainy towards the end of November. Conditions were then quite suitable for further ploughing and sowing. The acreage seeded to wheat as officially published on December 1st is equal to that of a year ago. Germination is slow.

France.—Towards the latter part of November the weather was favourable for the new crops, and reports were mostly good. The area sown to wheat is reported to be larger than that of a year ago.

Spain.—The weather was favourable in November, and the outlook for the new crops satisfactory.

Italy.—The sowing of wheat was carried on under favourable conditions, and prospects were good in November. In December it was reported that there had been delays in seeding in some districts.

Roumania.—Early in November it was reported that the area sown to the new wheat crop would be very small. Latest reports on the new seedings are unsatisfactory on account of the lack of moisture experienced during the seeding period.

Russia.—A report received from the British Economic Mission in South Russia, estimates the Ukraine wheat crops this year at 328,000,000 bushels against an annual average of 248,000,000 bushels during the five years 1911-15, and, in addition,

there are old stocks of 120,000,000 bushels; the rye crop is estimated at 180,000,000 bushels against an average of 171,000,000, and the reserves are estimated at 64,000,000 bushels. There is reported to be a large amount of grain in South Russia if it could be moved, but at present it is not available for shipment.

India.—The general agricultural outlook in November was favourable. Further re-shipments of Australian wheat were being made. Wheat and oil seeds are expected to have a full acreage.

Mexico.—Reports show that the wheat and corn crops are heavy, being more abundant than for several years past, and they promise to be sufficient to supply all the needs of the country.

Argentina.—The weather was unsettled towards the end of November. Moderate to heavy rains in various districts were followed by frosts in Central and Southern Buenos Aires, the Southern Territories, etc. where there were complaints of damage to wheat by frost.

Australia.—Some rains fell in the latter part of November in the droughty regions of New South Wales, and reports of the general agricultural outlook were less pessimistic. The year's wheat crop was not expected to be more than sufficient for home consumption.

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February, 1920

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE

The Agricultural Gazette of Canada

EDITOR: J. B. SPENCER, B.S.A.

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Minister of Agriculture

OTTAWA
J. DE LABROQUERIE TACHÉ
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1920

MAP OF CANADA SHOWING THE LOCATIONS OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

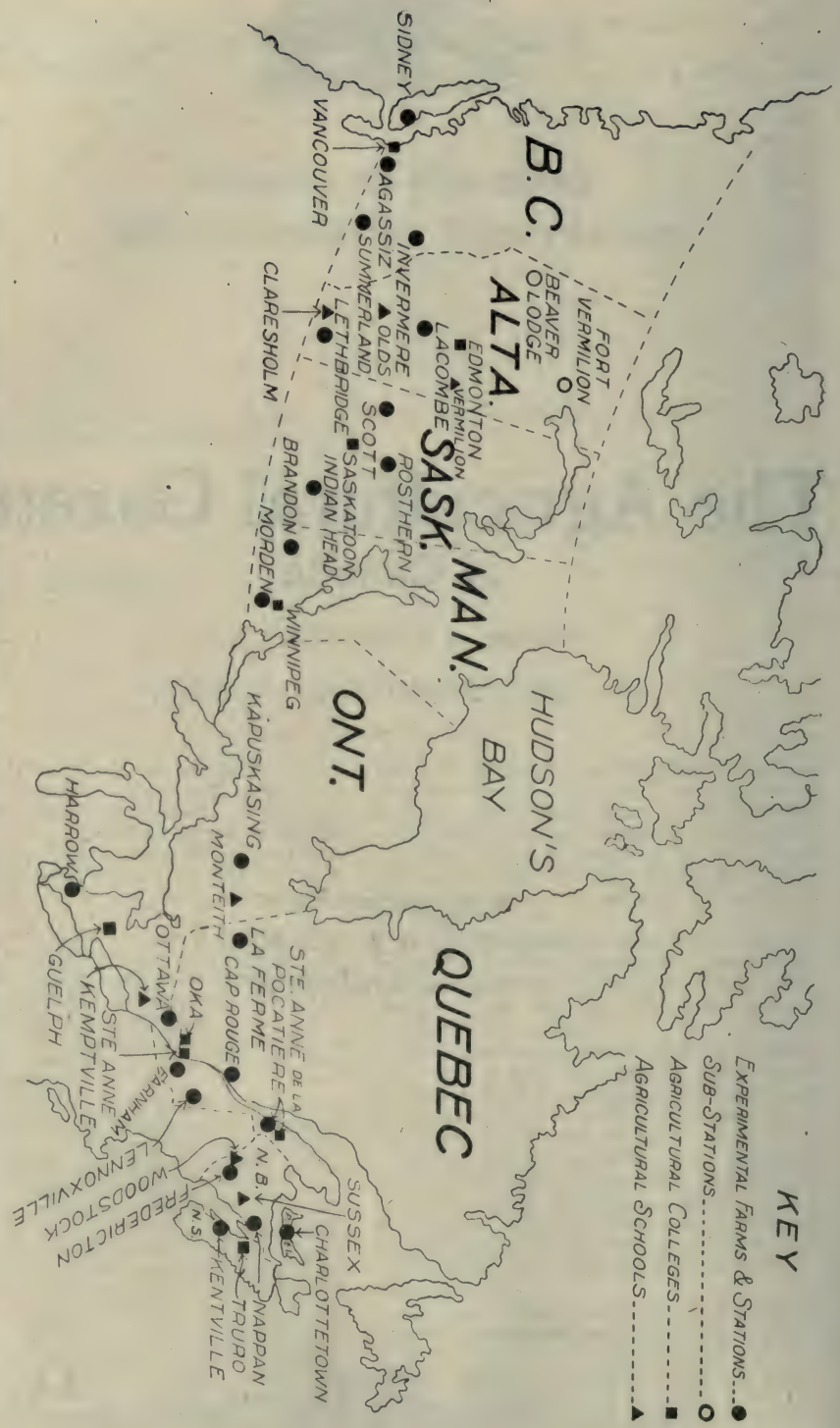


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FEDERAL ASSISTANCE TO THE DEVELOPMENT OF COLLEGES AND SCHOOLS OF AGRICULTURE

BY WM. B. VARLEY, ASSISTANT TO THE AGRICULTURAL INSTRUCTION ACT COMMISSIONER

THE part to be played by the agricultural college in the era of human progress following the Great War formed the theme of a series of articles appearing in the January number of THE AGRICULTURAL GAZETTE. The keynote of these articles may be said to have been a recognition of the importance of specialized education in connection with Canadian agriculture, and of the responsibility resting upon the colleges for equipping their students with a training that will enable these men to take position in the foremost ranks of human progress and achievement. It is expected that these institutions shall not only fit men for farm callings, and turn out teachers, administrators and highly trained investigators, but that they shall instruct their students in the social sciences as applied to agriculture in order to qualify them to enlighten the community to which they belong in dealing with questions of this character. They recognize, in a word, that their function is to prepare young men both for vocational agriculture and for citizenship.

It is encouraging to know that, from Ontario westward, every province of the Dominion now has an agricultural college, established and maintained at the public expense, for the purpose of preparing men to become either practical and scientific farmers, or instructors, investigators and leaders in connection with the basic industry of agriculture.

In the East a similar service is being rendered by the Macdonald College, an institution established as a private bequest, but receiving aid from the public treasury, and by the Agricultural College at Truro, Nova Scotia, the latter serving the needs of the Maritime Provinces. Quebec province has in addition two institutions designed to afford instruction in agriculture to French-speaking Canadians.

When in 1912, the federal authorities determined to place public moneys at the disposal of the provinces for the benefit of agriculture, it was at once recognized that a portion of the fund might with propriety be employed in increasing the efficiency of the agricultural colleges. It was accordingly agreed that the grant might be employed in enlarging their capacity, strengthening their staff and adding necessary equipment, according to their individual needs, so that they might the better serve the purpose for which they were established.

Under *The Agricultural Aid Act* of 1912, the following was the allocation made for the purpose. In each province except Saskatchewan this preliminary grant was devoted to building extension and equipment:—

Ontario.....	\$ 40,000
Quebec.....	20,000
Nova Scotia.....	31,288
Saskatchewan.....	15,000

\$ 106,288

In 1913-14 the original Act was superseded by *The Agricultural Instruction Act*. Under the latter the policy of assisting the agricultural colleges was continued. But in the case of Alberta, it was decided, in accordance with the desire of the provincial authorities, to assist in the maintenance of three district agricultural schools established in that province rather than to contribute to the College of Agriculture. Likewise in the province of New Brunswick, where no college existed, a building was provided at Sussex for an agricultural school, while at the Fisher Vocational School at Woodstock, provision was made for giving instruction in agriculture. In Prince Edward Island the assistance took the form of amplifying the agricultural course at Prince of Wales College. This course was later on developed as a rural science department in connection with the movement to establish the teaching of elementary agriculture in the schools.

A summary of what has been accomplished with the aid of federal moneys from 1912 to the present time, under the provisions of the two Acts cited above, for the development of provincial colleges and schools of agriculture is as follows:—

Ontario.—At the Ontario Agricultural College, to meet the steadily growing demand for increased building accommodations, there have been added a field husbandry building, a poultry building, a physics building and a new residence (now under construction). Federal funds were

also used in the completion of the dairy barns, and in the reconstruction of the bacteriological building. Numerous staff additions have also been made.

The Agricultural School at Kemptville, Ontario, now in process of development, is being financed entirely from the Agricultural Instruction grant. This when completed, will constitute a vocational residential school and farm, with ample land, buildings and other equipment. The regular course will comprise agriculture for boys and household science for girls. Pending the completion of the school, short courses in these subjects are being provided during six weeks in the early part of each year.

Quebec.—Macdonald College is assisted by an annual grant from Agricultural Instruction moneys. None of the money being required for building purposes, the grant has been employed largely in extension work in the English-speaking districts, including school agriculture, women's work, orchard, poultry and sheep demonstrations, while a part has been used to carry on various lines of research.

At the Agricultural Schools at Oka and Ste. Anne de la Pocatière increased building accommodation and equipment have been provided, and at each of these institutions the salaries of the staff have been supplemented from the federal grant.

Saskatchewan.—The grant to the Saskatchewan College of Agriculture led to the development of a wide range of extension activities by that institution, besides augmenting the staff for teaching and for investigation and research work. None of the funds have been made use of for building purposes.

Alberta.—The federal grant to the province of Alberta does not assist the College of Agriculture, but is employed instead in financing the three Schools of Agriculture, contributing towards staff salaries, supplies, and equipment. Short courses

and other extension activities are carried on by the Schools.

British Columbia.—In 1918-19, Instruction Act moneys were allocated for the first time to the newly organized College of Agriculture of the University of British Columbia. The grant is made as a contribution towards the cost of investigation and extension work at that institution.

Nova Scotia.—With the assistance of the federal grant, the Nova Scotia Agricultural College was enabled to enlarge its main building and to provide a science building, costing over \$100,000, which is to be paid for in annual instalments. A considerable sum is used annually in supplementing staff salaries. By these means the efficiency of the College as a teaching institution has been greatly increased.

The following is a statement of the sums allotted to agricultural colleges and schools, in the provinces participating, for the period covered by *The Agricultural Instruction Act* 1913-14 to 1919-20. To these amounts should be added the expenditure under the *The Agricultural Aid Act*, given above—

AGRICULTURAL COLLEGES AND SCHOOLS
1913-14—1919-20

Ontario.....	\$ 691,313
Quebec.....	483,819
Saskatchewan...	160,276
Alberta.....	261,200
British Columbia	20,000
Nova Scotia....	207,683
New Brunswick.	65,852

\$ 1,890,143

THE CANADIAN GOVERNMENT ELEVATORS AND THEIR SERVICE TO THE AGRICULTURISTS OF WESTERN CANADA

BY R. HETHERINGTON, SECRETARY, BOARD OF GRAIN COMMISSIONERS FOR CANADA

THE Trade and Commerce Department of the Canadian Government, through the Board of Grain Commissioners for Canada, has erected and is now operating five large grain elevators in the Dominion.

The entry of the Government into the commercial handling of grain was due to considerable agitation on the part of the agricultural interests regarding the operation of privately owned terminal elevators. A public terminal elevator was built by the Government at Port Arthur, Ontario, with the primary object of furnishing facilities whereby the agriculturists of the West would have the opportunity of consigning their grain to, and having it completely handled at an elevator owned and operated by the Government.

With this object still in view further elevators were erected by the Government. These elevators might be classified under the three headings of "Public Terminal," "Interior Terminal" and "Transfer". The Public

Terminal is located at Port Arthur, Ontario; Interior Terminals at Moosejaw, Sask., Saskatoon, Sask. and Calgary, Alta., and the Transfer Elevator at Vancouver, B.C.

PUBLIC TERMINAL ELEVATOR

As already stated, the first unit of this system was the public terminal elevator at Port Arthur, which was completed in 1913 at an approximate cost of \$1,500,000. This elevator has a total capacity of 3,250,000 bushels of grain. The work-house has a capacity of 750,000 bushels and is equipped with the most modern machinery for the proper handling, drying, cleaning and preservation of grain. It might be well to state here that all the elevators operated by the Board of Grain Commissioners are of the most modern and fire-proof construction.

INTERIOR TERMINAL ELEVATORS.

In September, 1913, contracts were let for the construction of two interior

terminal elevators, one at Moosejaw, Sask., and the other at Saskatoon, Sask. The former was opened to receive grain on Oct. 14, 1914, and the latter on Oct. 12, 1914. These elevators, which cost over \$1,000,000 each, are duplicate plants, having been constructed from the same set of plans and specifications, except for minor alterations rendered necessary by local conditions. The capacity of each is 3,500,000 bushels. The work-house, which has 112 bins with a capacity of 500,000 bushels,

Saskatoon plant being purchased from the city, whilst at Moosejaw the power is furnished by a Diesel Oil Engine plant operated in conjunction with the elevator.

Each elevator is built on a site containing approximately 50 acres of land, and is served by three receiving and two shipping tracks. At Saskatoon the elevator trackage is directly connected with the tracks of the Canadian Pacific, Canadian National and Grand Trunk Pacific Railways. At Moosejaw the tracks are



PUBLIC TERMINAL ELEVATOR AT PORT ARTHUR

The primary object of this Canadian Government elevator at the head of inland navigation is to furnish facilities which enable western grain growers to have their grain completely handled under government supervision and control.

is equipped with ten No. 9 Monitor Separators, two Monitor Flax Separators, one Monitor Screenings Separator, and one Richardson's Wheat and Oats Separator.

The storage annex consists of 150 bins, having a capacity of 3,000,000 bushels. The drying plant, having a capacity of 24,000 bushels of damp grain per day, is installed in a separate building adjacent to the elevator.

All machinery in these elevators is electrically driven, the power for the

directly connected with the Canadian Pacific and Grand Trunk Pacific Railways.

In June, 1914, a contract was let for the construction of an elevator of similar design and equipment at Calgary, Alta. This elevator, which has a capacity of 2,500,000 bushels, was opened to receive grain on August 7, 1915. The cost of this plant was slightly over \$1,000,000. The elevator trackage is connected by direct spur tracks with the Canadian Pacific and Canadian National Rail-

ways, whilst cars from the Grand Trunk Pacific Railway are received over the transfer tracks operated by that company in conjunction with the C.P.R.

FUNCTIONS AND FACILITIES

These interior terminal elevators are entirely different from the country elevators. The difference lies not merely in their limited number and much larger capacity but also, and more particularly, in the func-

elevators situated at the head of the Great Lakes or at ocean ports. These differences are evident from a statement of the purposes which the interior terminals are intended to serve. These purposes are:

1. To provide facilities for meeting emergencies which experience has shown frequently occur effecting the grain trade of Western Canada. There have been from time to time congestions due to shortage in storage and shortage in cars, and there have also been seasons when, owing to the lack of drying and other hospital facilities in the grain field, there has been very serious loss



INTERIOR TERMINAL ELEVATOR

These elevators owned by the Canadian Government and located at Saskatoon, Moose Jaw, and Calgary are fundamentally different from terminal elevators situated at lake or ocean ports. They provide hospital facilities, alleviate congestion, and, in short, are insurance houses for western grain growers.

tions they are intended to serve and their general economical character. They are provided with all inspection facilities by the Inspection Department, and with all weighing facilities by the Weighing Department. Official inspection and weighing facilities are thus brought near to the producer. Official certificates of weight and grade are issued, and warehouse receipts are issued and registered.

These elevators are also fundamentally different from the terminal

incurred by the producers of grain.

The interior terminal elevators were intended, in the first instance, to provide for such emergencies. In this respect they are insurance houses, radically differing in character from terminals at lake or ocean ports.

2. To provide a certain amount of surplus storage as near to the point of production as possible.

3. To provide a certain amount of cheap storage for local mills throughout the West, thereby stimulating the milling industries of the Prairie Provinces.

4. To provide means whereby the agriculturalists of the West might have an opportunity of retaining some of the by-products

of the grain in the West, thereby supplying one of the conditions necessary for the adequate development of mixed farming.

5. To give the agriculturalists an opportunity to take full advantage of all available markets, whether West, South or East, as the demand might arise.

TRANSFER ELEVATOR

The third class of elevator operated

monstrate the feasibility of shipping grain by the Panama route to Europe, as well as to facilitate trade with the Orient, it being intended that the elevator should operate for those purposes in conjunction with the interior terminals at Moose Jaw, Saskatoon and Calgary.

Ultimately it was the intention of the Government, in the event of the



TRANSFER ELEVATOR AT VANCOUVER, B.C.

This elevator establishes a connecting link on the Pacific coast and facilitates the grain trade with the Orient and with Europe by the Panama route.

by the Board is the Transfer Elevator erected at Vancouver, B.C. in 1916 at a cost of \$800,000. This elevator is also equipped with the most modern machinery for the economic and efficient handling of grain, including sacking machinery. The object of this elevator was to establish a connecting link at the western coast, and in order to de-

Hudson Bay Railway being completed, to erect a large terminal elevator at Port Nelson, the terminus of the railroad, thereby supplying the agricultural interests of the West with a complete system of interior terminal and transfer elevators to handle their grain practically from the point of production to all available ports on the borders of the Dominion.

The United States School Garden Army is not a temporary organization but aims at permanency of production through education. For 1920 it has outlined complete plans of organization and in a circular issued by the Department at Washington it states the age of enrolment, requirements for enlistment, officers, and the insignia to be worn by the various ranks;—captain, 1st lieutenant, 2nd lieutenant, and privates. At the end of the garden season a certificate signed by the Secretary of the Interior, the Director of the U.S.S.G.A., and by a local official, will be presented to children who have achieved a real success. The standards, which will be left largely to the local supervisors or teachers, will be high but will be such as can be reached by all children who make an honest effort.

PART I

Dominion Department of Agriculture

THE EXPERIMENTAL FARMS

CEREAL DIVISION

CO-OPERATIVE WORK WITH THE FARMERS OF CANADA

BY J. G. C. FRASER, ASSISTANT CEREALIST.

THE Cereal Division of the Experimental Farms Branch has been, and is, actively engaged in co-operative work with the farmers of Canada. By the testing of new kinds of grain and the free distribution of pure, improved varieties to the farmers, it has done a great work in improving both the quality and the yield of the grain grown in the Dominion of Canada.

The effort began in the spring of 1886, shortly after the Experimental Farms were organized, to introduce among the farmers of Canada the best varieties of seed grain obtainable, has been continued to the present and has been attended with excellent results, which must, in future years bring about a still more marked improvement in the quality of the grain produced in Canada.

A short history of the free seed distribution and co-operative work done by the Cereal Division would not be out of place here. In 1886, when the Canadian Government passed the Act under which the Experimental Farms Branch was established, one of the first essential duties performed was the introduction, growth and distribution of good seed. It was provided that they "should test the merits, hardiness and adaptability of new and untried varieties of wheat or other cereals, and of such grasses and forage plants, and to disseminate among the persons engaged in farming

upon such conditions as are prescribed by the Minister, samples of the surplus of such products, as are considered worthy of such introduction."

In the spring of 1888, the work of distributing samples to farmers was actively carried on and some 2,150 small bags of grain were sent out. Accompanying each sample was a report form which had to be filled in by the farmer, giving dimensions of plot in which seed was grown, previous crop, dates of sowing, flowering and ripening, yield obtained, and remarks. From these reports, which are returned by the farmers at the close of the season as soon after harvest as convenient, it is possible to arrive at a fairly accurate idea of what varieties are superior and in what districts they can be expected to do the best. In 1889, the free Distribution consisted of some 2,760 samples and by 1890, the figures jumped to 12,353 packages from the Central Farm and 5,896 from the various Branch Farms. From then, till 1897, the annual number of samples sent out gradually increased and then reached the maximum, when 33,983 samples were mailed from Ottawa and 2,407 from the various other Farms; a total of 36,390 samples to 35,856 applicants. In 1899 a new policy was inaugurated by which larger samples, sufficient to sow 1-10 of an acre, were distributed to specially picked farmers, who had, in previous years, shown special interest in the co-operative

work with the Experimental Farms. On account of the larger samples being sent out (some 4,320) the total number was reduced, although the total quantity of the grain sent out was the same. The distribution of large samples continued till 1903, when, due, in a large measure to the dissatisfaction expressed at a few farmers receiving more favoured treatment than the rest, the idea was dropped and every body was placed on the same footing. All during this time, great pains had been taken to send out only first-class grain. During the first ten years of the work 638 tons of first-class material were sent out, so that some idea of the work that this free distribution necessitated, can be imagined.

In 1911, Dr. C. E. Saunders took charge of the work, as Dominion Cerealists. That year, owing to poor crops and the difficulty of procuring good seed, the distribution was reduced to 12,190 samples. In 1912, more stringent regulations were adopted in order to prevent waste of good seed, and only those who had previously sent in good reports and who had shown some thought in making out their application forms, received samples. Owing to standards of education being raised and the farmers taking a keener interest in their profession, it became necessary to raise, also, the standard of the seed sent out. At the same time, in order to avoid duplication, the grain for distribution was centralized and sent out from Ottawa, the Branch Farms discontinuing the work, as far as the grain distribution was concerned. The farmers at this time were asking for a higher standard of grain than formerly, and as even the most improved machinery will not clean grain completely, hand-picking had to be resorted to. In order to keep grain true to type, it necessitates picking over many thousands of pounds of grain. From 1914 to 1918, with the war and the consequent shortage of labour, the distribution was reduced to an

average of 7,000 per year, but the quality of the seed was maintained and even improved. Now with the war over and conditions becoming more normal, the distribution will again be increased and it is expected that this year, the free distribution will approach the 20,000 mark.

The preparation of the seed for dissemination, as intimated before, requires time and a great deal of close, tedious work. First of all, the fields, in which the grain is grown, are rogued, *e.g.*—all impurities are pulled out by hand while the crop is growing. Then, when ripe, the grain is passed through a threshing mill, in which great care has been taken to remove all the seed of the previous crop threshed. The threshed grain is then fanned very carefully, the operation being repeated till a satisfactory, clean sample is obtained, and is finally handpicked by experienced men. Before the seed is ready for distribution, the Dominion Cerealists, or one of his assistants, inspects the bulk samples. A very strict rule is adhered to and no sample for distribution is sent out which contains more than two false grains in four pounds of seed, only one of these may be a weed seed. The samples must also be of standard weight per measured bushel and in the majority of cases are considerably better in that respect.

The purpose of all this work, is to co-operate with the farmers of the Dominion in introducing early, high yielding varieties of grain, best suited to the many different climatic and soil conditions found in this wide Dominion of Canada.

Thus, since the inauguration of the Experimental Farms Branch a wide and comprehensive co-operative scheme has been carried on, in which the farmers have, from the start, aided in a very enthusiastic manner. The total number of grain samples sent out amount to more than 592,000, and from the appreciative letters received from farmers, who have received

samples and have worked co-operatively with the Experimental Farms, it is evident that the work

of the Experimental Farms is doing much good and is accomplishing the object for which they were begun.

TRAINING RETURNED SOLDIERS FOR WORK ON THE LAND AT THE EXPERIMENTAL FARM, AGASSIZ, B.C.

THE Experimental Farm at Agassiz, British Columbia, in co-operation with the Vancouver Branch of the Soldier Settlement Board, assisted in training for the land, to some extent at least, some 300 returned soldiers during the past summer. The Soldier Settlement Board erected a bunk house on the farm in which the men were supplied with board and lodging. An instructor or two, depending on the number of men training at a time, were on hand to assist and instruct the men in their work and to do the numerous duties a position of the kind entails. The Farm supplied the necessary tools and equipment to work with and allowed the students to work with the farm employees in different branches of the farm work.

The men taking the course were divided into six groups and were instructed in different general lines of work each week, so that by the time they finished the course they had a slight working knowledge of farming, and, what was more important, had tested for themselves the actual farm work and were in a better position to judge for themselves the merits and disadvantages of farming. Men with previous farm experience were usually qualified by the Board after a six weeks course at Agassiz but generally the men were required to work for a longer period on a privately owned farm where further experience was obtained.

The course given, briefly described, was as follows, depending on

the season of the year:—

First Week, *General farm work*:—hoeing, manure handling, fencing, threshing, crushing grain, harvesting, haying, silo filling,

and care of machinery.

Second Week, *Horses*:—Feeding, cleaning, harnessing, driving hitched to waggon, plough, harrow, cultivator, roller, etc.

Third Week, *Cattle*:—general care, feeding, cleaning, milking, buttermaking, milk testing, care of utensils.

Fourth Week, *Sheep and Swine*:—general care and feeding, breeding, castrating, docking, care at lambing and farrowing time.

Fifth Week, *Poultry*:—feeding, trapnesting, incubation, housing. *Garden*: Work with the gardener, weeding, planting, pruning, harvesting fruit and vegetables.

Sixth Week, *Land Clearing*:—Underbrushing, burning brush, making firewood, blowing stumps, breaking new land.

Whenever possible two lectures a week were given the men by some officer of the farm or some other agricultural expert, on a practical farm subject. Generally speaking the men were interested in their work and were optimistic about the future. Occasionally a man would learn in a day or two that farm work was not just what he had pictured it and would decide to go back to his old profession.

At several other farms under the Dominion Experimental Farms system the work of training returned soldiers for Agriculture is being taken up. In the March issue of The Gazette reports dealing with the training of soldier farmers at the several other farms will be published.

DAIRY AND COLD STORAGE BRANCH

REPORTS FROM CARGO INSPECTORS IN GREAT BRITAIN

W. W. MOORE, CHIEF MARKETS DIVISION

FOUR Cargo Inspectors, working under the direction of the Dairy and Cold Storage Branch, are stationed in Great Britain at the ports of Liverpool, London, Glasgow and Bristol, for the purpose of reporting the condition in which Canadian farm products are landed from the steamers, removing the temperature charts from the thermographs, etc. Besides a detailed report on each cargo and special reports from time to time, as occasion may require, the inspectors send a regular monthly letter, reviewing in a general way happenings at the port in connection with the importation of perishable produce. The following extracts are taken from letters dated December 18th to 20th, 1919.

FROM THE CARGO INSPECTOR AT LIVERPOOL,
ENGLAND

"I have several times advocated the tying or wiring of boxed apples, and as there have been several lots here lately done in this way, mostly wired, I have taken particular notice as to how they have landed, and in each case it has been very good. I will give you an account of the latest shipment ex SS. "Stanmore"—the only parcel wired was a lot of 810 boxes, out of which 8 boxes were slightly broken, yet there were two or three thousand broken out of the other lots, many of which were sent up in baskets or boxes mixed with loose tins of canned fruit. Yet all were handled by the same workmen. All this fruit was Californian or Washington. At the SS. "Rexmore" last week there were also several big piles of broken Californian boxes, but I did not see any particular lot wired or tied."

FROM THE CARGO INSPECTOR AT LONDON,
ENGLAND

"The chief item of note during the last month has been the large shipments of eggs that have been arriving at this port from Canada, consigned by both Canadian and American senders, the produce of both countries. Many cases of American origin have been shipped by Canadian firms, but the fact that the contents are of American origin continues to be, in many instances, quite faintly marked on the outside of the cases."

"Presumably because the end of the season has been nearly reached, the condition of several consignments have been described to me by receivers as being very uneven, but there has been little damage noticeable from an exterior view, the discharging and general handling having been carefully undertaken. It has been quite unusual to have any quantity of cases needing repair, but where this has been necessary the contents have been usually pilfered. It is worth while noting on this head that, during this week, a London magistrate in sentencing dock workers for pilfering goods from ships stated that he was compelled to regard the docks as being infested by gangs of thieves so constant were the cases that were coming before him. Unfortunately the same thing seems to be happening on the railways, the number of claims in this account alone having reached unprecedented figures."

"Cheese continues to come forward in small shipments, the SS. "Verentia" having brought about 9,000, whilst the SS. "Venusia" docked on the 4th instant with about 8,000. The condition of the cheese has been cool and dry, whilst the boxes were in somewhat ragged and frayed state. British made cheese was increased by 2d per pound to the public, making the retail price 1/8 per pound as from the early part of this month, whilst imported cheese must not be sold at more than 1/6 per pound until December 23rd, after which it is to be on retail sale at the same price as the British make, viz., 1/8 per pound. I understand that a current distribution has already been made, but until the 23rd instant it must not be sold at the increased price."

"There is nothing new to report with regard to apples since my letter of the 20th November, the position being about the same with ample supplies for all requirements of both home grown and imported kinds. British Columbian boxes have been coming forward in large quantities and generally speaking these have been in good condition, making nearly the controlled price 20/10 per case, although the larger sized fruit has frequently shown some waste and bruises, and prices have been proportionately lower. As stated previously English supplies are still very plentiful and although there are few good eating varieties, the difference in price, and the large quantities still to come forward, make them a serious competitor with imported apples."

"Transport workers at the docks are at the moment negotiating for further increases in wages and conditions, the minimum demand that is now being presented being for a daily wage of 16/- with proportionate

advances during overtime, etc. At the Surrey docks to-day I learned that the steam tug workers have just ceased work, but the general discussion on the matter noted above is still proceeding."

FROM THE CARGO INSPECTOR AT GLASGOW,
SCOTLAND

"During the past two months, owing to the more regular arrival of steamers from Montreal and Halifax, trade has been increased by larger arrivals of eggs and apples, but cheese, as well as meats, has fallen off considerably. Some difficulty regarding the selection of apples on the dock has again arisen as, owing principally to the adverse weather conditions, (frost and heavy snow) making transit difficult, some steamers' cargoes were held up on the docks longer than would have been the case in better weather, and other steamers coming in before these cargoes were removed made the shipping companies rather diffident in allowing quay selection here. Until we have a regular and recognized berth for the purpose of discharging apples only, during the apple season, I am afraid there will always be difficulty between shipping company and consignee on this question."

Eggs.—"One or two complaints of breakages which have been advised in my reports are to be noted here. These have been caused by careless packing and the use of only a handful of wood wool, instead of the usual excelsior pad. Canadian eggs arriving within the past month or two have practically all been sold before arrival, leaving States eggs alone to sell, and these have had a somewhat slow market up till now, when eggs are getting much scarcer, and they begin to move more freely."

Apples.—"The arrivals for the past two months have been large and general con-

dition fairly good, although some of the later lots have shown traces of frost. This was noticeable more in Nova Scotians latterly than in Ontario or British Columbia apples, although they to a lesser extent also showed traces. These facts are reflected in the prices made for the different kinds at sale here, and emphasize the fact that Nova Scotian apples are not quite so popular on this market as others from Canada. British Columbia apples have had an opportunity this year which they have taken at the right time, and I think we may say with confidence that they have established themselves in this market in a way that, if they maintain their quality and condition as sent this year, will be difficult to shake."

FROM THE CARGO INSPECTOR AT BRISTOL,
ENGLAND.

"I am sending herewith report No. 24 which completes the arrivals from Montreal for this season. In general the cargoes have all come along in good shape, our cheese and butter imports amounting to 104,272 boxes and 16,205 packages respectively, and we have had a good season as to Canadian meats. Large quantities of fresh meats have come to hand in the ships' refrigerators and with very few exceptions they have landed in good hard frozen condition."

"Since I last wrote you we have had two further shipments of boxed apples from British Columbia and all have landed in first rate condition. The receivers here are very pleased with them."

"During the season in all 44 thermographs were placed on board the various steamers and all showed good working results. There is no change in regard to the control of cheese and butter and the latter commodity is still rationed at 1 ounce per head per week."

ENTOMOLOGICAL BRANCH

ENTOMOLOGIST FOR FOREST INSECT WORK IN BRITISH COLUMBIA APPOINTED

BY DR. C. GORDON HEWITT, DOMINION ENTOMOLOGIST

MR. Ralph Hopping has been appointed as Entomologist to take charge of the forest insect work in British Columbia, under the direction of Dr. J. M. Swaine, Chief of the Division of Forest Insects, and he commenced duties in December. Mr. Hopping has had a lengthy, practical experience of forestry operations and forest insect control work in western forests. He has been attached to the United States Forest Service for twelve years and for seven years he had charge of

insect control work in the National Forests in California. During the war his territory included the states of Arizona, New Mexico, and Colorado. Few men have had a wider practical experience of forest insect control operations, and Mr. Hopping is now engaged in planning and supervising control operations for bark-beetle outbreaks in southern British Columbia, where these insects have been responsible for extensive losses in valuable timber during the last few years.

FRUIT BRANCH

FREIGHT RATES ON FRESH FRUITS

BY G. E. MCINTOSH, IN CHARGE OF TRANSPORTATION

IN March, 1904, the Ontario Fruit Growers' Association in behalf of the fruit shippers in eastern Canada appealed to the Board of Railway Commissioners for more favourable freight rates on fresh fruits moving within Ontario and Quebec, interprovincially between these provinces and the Maritime Provinces, and to distributing points in western Canada.

For the purpose of giving legal effect to an agreement which had been arrived at between representatives of the complainants and the railway companies, the Board issued an Order, dated October 10th, 1904. This agreement provided satisfactory rates in eastern Canada and special rates to Winnipeg, Portage la Prairie and Brandon.

Application was made to the Board of Railway Commissioners in 1909 by the Canadian Freight Association for an order rescinding that part of the Board's Order fixing the rates on fruits in carloads from eastern Canada to the above points. The application, however, was dismissed, Commissioner McLean referring thereto in his judgment, dated September 16th, 1909, as follows:—

"In view of the exhausted discussion both oral and written which led up to the arrangement now before us I am unable to see why, in the absence of more exact information than is now before us, this well considered compromise should be departed from."

Between 1904 and August, 1918, the markets for Ontario fruit and vegetables in the West were greatly developed. The carriers evidently appreciated this increased tonnage, and voluntarily added to the distributing centres, extending also corresponding rate privileges as far west as Edmonton, the covering tariff applying to some eighteen different points west of the Great Lakes at the time of cancellation.

Effective August 20th, 1918, the Canadian Freight Association issued Tariff No. 5-B, C.R.C. 19. This tariff wiped out the special rates on fruit from Ontario and Quebec to Winnipeg, Portage la Prairie, and Brandon, and made effective a rate approximately 58 per cent greater to Winnipeg, 74 per cent to Portage la Prairie, and 62 per cent to Brandon, instead of the old rate plus the authorized general increases of 15 per cent and 25 per cent.

Complaint was made to the Board of Railway Commissioners in behalf of the fruit shippers, and on January 10, 1920, the following Order was issued:—

"Upon hearing the submissions of the Freight Traffic Manager of the Canadian Pacific Railway Company, on behalf of the railway companies interested therein, at the sittings of the Board held in Ottawa on the 16th day of September, 1919, the Canadian Pacific and Grand Trunk Railway Companies the Canadian National Railways, the Canadian Freight Association, and the Fruit Branch of the Dominion Department of Agriculture being represented at the hearing, and what was alleged; and upon the report of the Chief Traffic Officer of the Board; and reading the written submissions subsequently filed on behalf of the Fruit Commissioner of the said Department, and it appearing that the said tariff contravenes the Order of the Board dated October 10th, 1904, in the complaint of the Ontario Fruit Growers' Association, and the Order of the Board No. 8207, dated September 27th, 1909, dismissing the application of the Canadian Freight Association for an Order rescinding the said Order of October 10th, 1904—

It is ordered that the Canadian Freight Association's Tariff C.R.C. No. 19, effective August 20th, 1918, be, and it is hereby, disallowed.

And it is further ordered that the Canadian Freight Association, in virtue of the authority thereupon conferred by powers of attorney of the railway companies interested therein, forthwith publish and file a tariff restoring the rates on fresh fruits from points in Ontario and Quebec to Winnipeg, Portage la Prairie and Brandon, in the Province of Manitoba, prescribed in the said Order of the Board dated October 10th, 1904,

as increased by authority of the Order of the Board No. 212, dated January 15th, 1918, and as further increased by Order in Council No. P.C. 1863, dated July 27th,

1918; the said increases having been continued in effect by the General Order of the Board No. 276, dated December 31st, 1919.

DISTRICT FRUIT INSPECTOR APPOINTED

MR. Robt. E. Robinson of Montreal, P.Q., returned soldier, has been appointed to the position of Chief Fruit Inspector for Eastern Ontario and Quebec. He will have charge of the enforcement of the Inspection and Sale Act, Part IX, and will direct

the work of temporary and permanent fruit inspectors in his district.

Before enlisting, Mr. Robinson had considerable experience in the buying, shipping, and selling of fruits both in Ontario and Nova Scotia.

LIVE STOCK BRANCH

CANADIAN CHAMPIONS ON EXHIBITION IN EUROPE

BY H. S. ARKELL, M.A., B.S.A., DOMINION LIVE STOCK COMMISSIONER

THE Federal Department of Agriculture has arranged for the exhibition in several countries of Europe of the pure bred Shorthorn steer, "Roan Jasper", champion steer of the Guelph Winter Fair in December, and of the grade Angus steer, "Black Hector", champion steer at the Toronto Fat Stock Show. These animals are the property of H. P. Kennedy & Company, Toronto, who purchased them at the Toronto sale. Mr. Kennedy is directly interested in the export trade in Canadian cattle and has co-operated with the Department of Agriculture in this special advertising scheme by donating these two high class animals and by landing them at Antwerp with a large shipment sent over by him in January.

"Roan Jasper" was bred and exhibited by J. M. Gardhouse of Weston and in addition to winning at Guelph at the Guelph Winter Fair, he was the grand champion steer at the Canadian National Exhibition in September. When shown in Guelph

in December at 15 months of age, this steer weighed 1,110 pounds. "Black Hector" was bred by A. & G. Whitlaw of Guelph and when shown in December at the age of 20 months, weighed 1,290 pounds.

On arrival at Antwerp the steers were taken in charge by a representative of the Department of Agriculture, acting under general direction of Honourable Philippe Roy, Commissioner for Canada in France, who is in charge of arrangements for exhibiting them at some of the larger centres in France, Belgium, and possibly Switzerland. The tour will continue for several weeks and when it is concluded the cattle will be sold and the proceeds will be contributed to charitable purposes.

The purpose of this somewhat unique undertaking is to make known to those engaged in the cattle trade in the countries visited, Canada's ability to supply finished cattle or bullocks of the desired type and quality for feeding purposes.

SEED BRANCH

STAFF CHANGES

MR. Alfred Eastham, B.S.A., F.L.S., has resumed his duties as Chief Seed Analyst after an absence overseas of four years. Major Eastham saw service in France and Northern Russia and was awarded the Military Cross and Distinguished Service Order. He is now located at Winnipeg in charge of the Seed Laboratory recently opened there, but will return to headquarters at Ottawa at the close of the present seed testing season.

Mr. Gordon M. Stewart has received permanent appointment as Seed Branch Representative and District Seed Inspector for Alberta and British Columbia with head-

quarters, Dominion Seed Branch, Calgary. Mr. Stewart was a seasonal seed inspector from 1914-18 and has since been Acting Representative and District Seed Inspector in the absence overseas of Col. H. L. Keegan, recently resigned.

The duties of the position are described as follows:

"To assume direct responsibility for the administration of the Seed Branch work in the district named, including the direction of an office and seed inspection staff, the administration of the Seed Control Act, supervision of the inspection of seed grain at government elevators or elsewhere under prescribed standards, promoting seed production and seed marketing, reporting on seed crop prospects, seed requirements, and other related work."

THE ROOT OF THE PROBLEM

If Agriculture be not profitable we cannot expect men and women to remain at it; nor can we expect the rural population to remain contented unless their children can obtain the educational facilities that are available to the children of the cities and towns. The very root of the problem lies in this matter of rural education, and in the development of a "Country Life" that offers not only profit, but education, health and a fair measure of enjoyment. Farm sanitation, good roads, beautification of farms, the use of rural schools as community centres, all these and many other issues are involved. A. C. Gorham, Director, Elementary Agricultural Education, New Brunswick.

PART II

Provincial Government Departments

SWEET CLOVER

Sweet clover as a farm crop has made rapid strides in public favour during recent years. In 1916 in the June number of *The Agricultural Gazette*, the conclusions reached by investigators were published. Experiments carried on since then have modified the conclusions then held. In the following series of articles field crop specialists in several of the provinces bring out the results of their more recent experiments and observations with the crop, not only for feeding purposes, but for soil fertilization as well.

QUEBEC

SWEET CLOVER AND ITS VALUE

BY R. SUMMERBY, PROFESSOR OF CEREAL HUSBANDRY.

SWEET clover at Macdonald College has shown itself to be a very high yielding crop. In an average of six years it has given a yield of 2.49 tons per acre as compared with 2.12 tons and 1.89 tons for alsike and red clover respectively. On account of its coarse character and its peculiar distinctive flavor along with its sometimes supposed weedy character it has been given a wide berth in the agriculture of the province.

In connection with the yield tests conducted here some simple experiments as to its palatability have also been conducted in co-operation with the Animal Husbandry Department. The result of our experiences and observations show that there is little dislike shown towards the distinctive flavor of sweet clover when fed green or cured property. Animals that are being stall fed will eat up all sweet clover, when cut green, except the coarse stalks. When cured into hay the proportion of the crop eaten depends very largely

on the coarseness of the stalks and the amount of leaves saved in curing.

Difficulty is of course experienced in curing sweet clover on account of the coarse sappy stems and the liability of losing the leaves, especially as it becomes more mature. If it is to be made into hay it should be cut very early in the blossoming stage and handled in such a way as to prevent the loss of leaves. On account of this coarseness and difficulty in curing, there seems little place for sweet clover as hay where alsike, red clover or alfalfa do well. Where, however, conditions are not suitable for these latter, and where sweet clover does well there is a place for sweet clover for hay.

Its highest value under normal conditions is probably as a green manure crop. It gives a very early growth, a high yield of organic matter, and is a nitrogen gatherer. Moreover it will grow on soils that are not suitable for any other legumes that can be used for the same purpose.

MANITOBA

SWEET CLOVER FOR GREEN MANURE

BY J. H. ELLIS, EXPERIMENTALIST, FIELD HUSBANDRY DEPARTMENT.

IN so far as the Soil and Crop Management Department of the Manitoba Agricultural College is concerned the work with sweet

clover, (*Melilotus Alba*), has been very limited up to the present.

With respect to the use of this crop for green manure we have one

pods were forming. The green weight per acre was $14\frac{1}{2}$ tons. When the silo was opened three months later the ensilage was in perfect condition with an agreeable odor. It was relished by the stock and proved to be palatable. The analysis made by the Chemistry department of the Manitoba Agricultural College shows that sweet clover ensilage contains moisture 72.62, fat 1.11, ash 1.64, protein 3.62, crude fibre, 9.79, carbo hydrates 11.22.

SWEET CLOVER IN THE ROTATION.

The place that sweet clover should

thin and the resulting growth weak. This method, however, deserves further investigation, and the sowing should be done earlier in the season.) (b) It is not killed when plowed down for green manure the same season as sown, hence it occupies the land for too long a period for a green manure crop in a grain growing rotation. (c) It does not commence to grow until rather late in the spring, and (d) two seasons are required for its development. The first season no hay crop is secured although some pasture may be provided.



CUTTING SWEET CLOVER FOR HAY AT THE MANITOBA AGRICULTURAL COLLEGE
Compare its luxuriant growth with that of Common Red Clover in lower right-hand corner.

occupy in the rotation in Manitoba is still a matter for investigation. Sweet clover has a few peculiarities of growth that do not lend it to rotation planning. (a) It does not thrive when sown with a nurse crop in Manitoba, and it should be sown alone. (We have tried sowing it with wheat and oats without success. This year we sowed sweet clover between the rows of corn the first day in August but the stand was

On Red River Valley soils it grows vigorous, rank and coarse, but on the sandy and lighter soils outside the valley sweet clover produces a much finer quality of hay. It is perhaps the only leguminous hay crop that will thrive on our lighter soils and we look upon it as a soil improvement crop in the reclamation of impoverished land and in combination with brome for correcting drifting soil.

SWEET CLOVER AS A FEED

BY G. W. WOOD, B.S.A., PROFESSOR OF ANIMAL HUSBANDRY

SO far, only a small quantity of sweet clover has been grown on the College farm; therefore, up to the present time, very little opportunity has been afforded us for testing its value either for pasturage or for hay.

In 1916, we pastured a field containing five acres of sweet clover, five acres of alfalfa and five acres of annual pasture—the latter composed chiefly of barley and oats. Both cattle and sheep were turned on the field when the sweet clover was about two inches high. The stock was allowed on this field nearly every day until the latter part of July. At this time, neither the cattle or sheep had touched the sweet clover, while both the alfalfa and annual pasture were closely grazed. The sweet clover then was cut for hay and after being removed, the field was again pastured. The stock, when returned pastured to some extent upon the sweet clover, although at all times

seemed to prefer the annual pasture and alfalfa.

It was felt, afterwards, that the sweet clover in this particular instance had not received a fair trial as the stock previous to being put in the field, had not acquired a taste for sweet clover and naturally when put in the field pastured on the alfalfa and annual pasture. These two pastures produced sufficient nourishment for the stock for the first few weeks and after that time the sweet clover had become rank and bitter and naturally, very unpalatable. Had a fence been put around the sweet clover at the beginning and the stock forced to pasture on this, it is very likely they would have acquired a taste for it.

The sweet clover hay was fed the following fall but as it was cut rather late and badly weathered in curing, it did not prove to be a very palatable feed and a large portion of it was wasted in feeding.

SASKATCHEWAN

SWEET CLOVER CULTURE

BY L. E. KIRK, IN CHARGE OF FORAGE CROP INVESTIGATION

SWEET clover is a crop with which our farmers are not familiar, but one that possesses qualifications that make it well worthy of a serious trial. As forage it will probably find its greatest usefulness for the present as a pasture crop. It may also be made into a good quality of hay, although it is somewhat difficult to cure, especially in bad weather. Its probable usefulness in Western Canada, however, lies as much in its value as a soil improver as in that of a forage crop. To what extent it will be used as a forage crop will doubtless depend very largely on its ability to fill the demand for a legume crop that can be fitted into our system of farming without adding to the cost of production.

In other words if a sufficiently hardy strain can be developed to come through our winters after being sown with a nurse crop, there is little doubt that it will become one of our foremost forage crops.

Only by trying out sweet clover in a sufficiently large and practical way under a variety of conditions will it be possible to correctly estimate its value to the country, and determine the places and circumstances where it will prove of the greatest benefit. At the present time our hardiest strain is being increased with this end in view.

We have done practically no work along the line of the feeding value of sweet clover. Its many advantages under our climatic conditions have

seemed so great and the practical evidence from the Western States as to its feeding value so favourable, that we have directed our efforts toward producing a hardier strain as well as toward studying the culture and place of sweet clover in our cropping system.

Work with sweet clover has now been under way at Saskatoon for seven years. At the present time there are ten different species and over two hundred plant selections under observation by the Field Husbandry Department. These differ greatly in yield, quality of forage, dates of maturity and hardiness, as

it may be said that while yellow sweet clover is finer in quality and earlier in maturing, the white appears on the whole to be more hardy. At present most of the seed on the market is of the latter kind. Commercial seed, however, leaves much to be desired and will doubtless be superseded in the near future by much more desirable locally developed varieties.

The seed should be sown at the rate of ten pounds per acre not more than two inches deep. If sown in rows 24 to 36 inches apart, 3 to 6 pounds per acre is sufficient. Inoculation, while generally advisable,



SECTION OF THE SWEET CLOVER "BREEDING BLOCK" AT SASKATOON, SASK.

Sweet Clover is a valuable leguminous plant on the Prairie farms and by experiments in selection varieties best adapted to western conditions are being brought out.

well as in other minor respects. Experiments are also under way to determine the best cultural practices to follow in growing the crop.

CULTURE OF SWEET CLOVER.

Like most other crops sweet clover has done best where sown on fallowed land. On account of its biennial nature, however, this preparation is too costly. Quite satisfactory stands can be secured from sowing on well worked fall or spring ploughing that is free from grass. The surface should be quite firm and the seeding should be done in the rainy time, generally in the month of June.

With regard to choice of varieties

is not essential.

By sowing sweet clover with a nurse crop, the net value of the crop is generally increased provided winter killing does not occur. In some winters and with tender strains, however, there is some danger in this respect. It is hoped that with the introduction of hardier varieties and the improvement of cultural methods that the use of a nurse crop will become general. If this method can be made a safe practice to follow it is obvious that sweet clover will have a much more extensive field of usefulness than it could otherwise have.

The crop will stand some pasturing the first season, and in favourable

years may be cut for hay, but as a rule it will be found more profitable to leave the fall growth standing so that it will hold a substantial blanket of snow. This gives winter protection and an extra supply of moisture for the next year.

Two crops are usually obtained the second season. It is important (1) that it be cut early, that is, as soon as the first blossoms make their appearance, if a good quality of hay is to be the result; (2) that the first cutting be high enough to preserve the buds on the lower part of the stem that are to make the second growth. About six to ten inches will be found the best, depending upon the height of the crop.

Sweet clover requires to be well cured in the field before being stored in the stack or barn. The plants should be well wilted in the swath but cured in the cock in order to preserve the leaves of the plants.

The essential thing in pasturing the crop is to keep the growth well eaten

down. This means starting the grazing early and keeping the pasture well stocked. If the crop is used for pasture only it is sometimes advisable to clip back with a mower the tall growing stems that get ahead of the stock to prevent them seeding and to encourage the development of fresh green shoots. While pasturing on sweet clover, cattle crave some form of roughage such as hay or straw. It is desirable that such roughage should always be available to the stock.

When a crop of seed is desired it must not be cut for hay early in the season. Unless the growth has been exceptionally rank the crop can be handled with the ordinary grain binder and separator. By threshing close enough to hull 90 to 95 per cent of the seed, the seed-coat is more or less scratched in the process with the result that the percentage germination will be greatly increased. Yields of five and six bushels per acre are commonly obtained.

ALBERTA

OBSERVATIONS ON SWEET CLOVER

BY G. H. CUTLER, B.S.A., PROFESSOR OF FIELD HUSBANDRY, COLLEGE OF AGRICULTURE, EDMONTON

IN the summer of 1918 a small plot about one-quarter of an acre in size upon which potatoes had grown the previous season was seeded with Sweet Clover (*Melilotus alba*). It was seeded with the Planet Junior drill in rows 8 inches apart at the rate of 8 pounds per acre. The crop came up quickly and made a very rapid growth. By fall it had attained a height of 18 inches, being thick and evenly distributed over the land. In fact the growth by October was so heavy that it seemed inadvisable, not, to say most wasteful to allow such a "mat" to go into the winter, lest smothering might result. On the other hand to cut it at this time meant loss through winter killing from exposure. It was decided how-

ever to cut some and allow the balance to stand, information could thus be gathered on both points. The yield obtained at this time was 3 tons 1,236 pounds per acre.

When spring arrived it was quite evident that the covering which had been removed on the one hand had served a useful purpose. The growth was very slow and uneven as compared with that in the piece which had not been cut. In fact the difference was quite noticeable throughout the growth of the first crop. The heavy covering on the other hand which had been allowed to go into the winter did not in the least smother out the stand or affect the crop in the following season.

During the summer of 1919 the crop

was tested (1) as a hay crop (2) as a pasture crop, (3) as a seed crop, as follows:—

1. Two crops of hay were harvested with the following results:—

Date Cut.	Tons	Lbs. per acre
June 26.....	2	1,616
August 15.....	0	1,644
Total.....	3	1,260

3. Seed was taken from the first crop only which was cut with the binder in September when the seed had ripened. The seed had not been threshed at the time of writing. From all appearances, however, the yield would be very high as the seed set perfectly. The quality too was excellent.

The following observations were made at Edmonton this season—

1. Sweet clover can be made into a good quality of hay if cut in the



SWEET CLOVER PLOT AT UNIVERSITY OF ALBERTA

This clover is too far advanced to make into hay of high quality.

2. Four cuttings were made during the season one in each of four months to imitate pasturing as closely as possible with the following results.

Date Cut	Tons	Lbs. per acre
June 3.....	3	1,700
July 3.....	3	360
August 2.....	2	140
September 16.....	0	1,170
Total.....	9	3,370

early stages before the blossom appears.

2. To cure it satisfactorily without losing a large percentage of the leaves great care must be exercised, as the leaves break off under the slightest provocation.

3. The hay when made into a good quality was relished by cattle and horses. If not made at the proper time the coarser parts were almost wholly refused.

4. As the yields would indicate sweet clover recuperates very quickly

after cutting, thus supplying much pasture during the season.

5. Sweet clover proved more drought hardy than alfalfa.

6. Under similar conditions sweet clover set an infinitely better crop of seed than did alfalfa—which was very poor. When alfalfa, however, was seeded in rows 24 inches apart, the production of seed was better although much poorer than that of sweet clover.

COMMENDABLE QUALITIES.

Students in the College of Agriculture, Edmonton, who have tested sweet clover testify to its drought hardness. They point out, however, that while it is bound to fill a large field of usefulness as a dry land crop it may become a dangerous weed in the irrigation sections.

In conclusion from experience and observations it does not seem too much to say that because of its many agronomic qualities sweet clover as a farm crop must play a leading part in the dry areas of Alberta.

The commendable qualities of sweet clover are as follows:—

1. Drought resistance;
2. vigorous growth;
3. pasture qualities;
4. nitrogen gathering propensities;
5. biennial character;
6. value as a short rotation plant;
7. seed producing properties;
8. green manuring value as a means of lessening soil drifting;
9. productiveness even under adverse conditions;
10. value as a wind break in open prairie;
11. value as a hoed crop commands the attention of farmers in those areas where the precipitation is less than 15 inches and where other clovers and alfalfa cannot be grown with satisfaction.

It must be borne in mind, however, that as a feed it is not as palatable as other clovers, and it may require more care in preventing it from taking on certain weed habits. In this connection it was observed that where sweet clover was seeded in June and ploughed under in the fall many of the roots persisted the following year, grew up and produced a vigorous growth in the succeeding crop of wheat.

BRITISH COLUMBIA

SWEET CLOVER PROBLEMS

BY P. A. BOVING, PROFESSOR AGRONOMY, COLLEGE OF AGRICULTURE

A COMMON conception about sweet clover is that the plant will grow and do well where practically nothing else will flourish. This statement certainly does not hold true in the case of the Province of British Columbia.

In considering the possibilities for growth and development of sweet clover in British Columbia one should distinguish on the one hand between the Pacific Coast regions with their more or less heavy precipitation and the interior dry belt districts on the other hand.

It is not possible to state, as yet, whether the failure of this plant on the coast, or rather the difficulty to establish a satisfactory stand of the same, is due partly to the heavy

precipitation or entirely to the common lack of bacteria and the comparatively low content of lime in the upland forest soils of the Pacific coast. The fact remains, however, that it is equally hard, and in some localities even more difficult to establish a good stand of sweet clover as to obtain a satisfactory crop of alfalfa. This object cannot be attained, as a rule, without the application of stable manure and lime and without inoculation with suitable bacteria.*

* It has been stated by various writers that alfalfa and sweet clover utilize the same bacteria. But if the nodule development on the roots of these two plants, as observed here, can be considered as a criterion of their relationship in this respect it would seem that such statements require some modification.

Again, in the interior where alfalfa normally can be grown without any difficulty the sweet clover is a common weed and grows rank along the flumes and irrigation ditches. There it is just as easy to obtain high yields of sweet clover as to establish a satisfactory stand of alfalfa.

However, the sweet clover has not yet won general recognition in the Province of British Columbia. The farmers of the interior maintain that there is very little reason for growing sweet clover under conditions that produce high and remunerative yields of the well known alfalfa. On the coast it seems to be the consensus of opinion that both alfalfa and sweet clover are so much more difficult to grow, and yield less per acre than an

ordinary clover mixture. There is consequently very little temptation, except possibly from the standpoint of curiosity, to discard the clovers and to introduce either of the two "novelties".

This general conception has been sustained so far by the results obtained in the department of agronomy. In our three years experiments at the University site, Vancouver, clover and grass mixtures have yielded on an average 6.83 tons of hay per acre while alfalfa has given us 4.31 tons of hay per acre, and sweet clover, grown under the same conditions, has only averaged the comparatively low figure of 3.82 tons of hay per acre.

COMMISSION OF CONSERVATION

SWEET CLOVER DEMONSTRATIONS

BY F. C. NUNNICK, B.S.A., AGRICULTURIST

WE have had some interesting results in connection with sweet clover grown on our illustration farms in Dundas county. Sweet clover cut and properly cured at the right season of the year has made very satisfactory feed for live stock, being relished by cattle and also by horses. We have found that it is absolutely necessary to sow the seed thickly in order to produce fine stalk which is more easily cured and more readily eaten and relished by live stock when made into hay. The amount of seed per acre should be not less than 20 pounds and I would say that 25 pounds is even better than 20 pounds. We have found that it must be cut early before the stalks become too hard as they contain too much crude fibre for best results in feeding if allowed to mature too far. Also, the crop must be cut high if a second crop is desired the same season. The second crop will produce seed but not in nearly so abundant quantities as the first crop if allowed to go to seed.

In 1918 a block of three-quarters of an acre was sown to sweet clover on low muck land belonging to Mr. Samuel Smythe, one of our illustration farmers in Dundas county. By the side of the sweet clover three-quarters of an acre was seeded to alfalfa. While the alfalfa came through the winter fairly well the sweet clover grew much more luxuriantly and more rapidly in the spring of 1919. It grew to a wonderful height and was left and harvested for seed. Three hundred pounds of seed of first-class quality was obtained from the three-quarters of an acre. This is at the rate of 400 pounds per acre. The alfalfa was very feeble and grew slowly and produced a very light yield. It was cut for hay and the second crop came along very slowly and did not become sufficiently tall to warrant cutting a second time. In this instance sweet clover did much better in muck land than in alfalfa. It may be that if the muck land could be drained, which in this case is a diffi-

cult matter, the alfalfa would do better. Mr. Smythe seeded about seven acres more of the muck land to sweet clover this spring and I may say that I never saw a finer stand of clover than was shown on this field after the nurse crop of barley was cut. On the three-quarters of an acre where the sweet clover seed was harvested I could not find a single plant of sweet clover growing after the seed crop was harvested. It was, of course, cut low, and the crop of seed maturing seemed to bear out the claim that when cut in this way the roots die.

As a pasture crop we have found sweet clover to work fairly well. On one field on the farm of Mr. Arthur Nash, Morrisburg, sweet clover and other clover and grasses were grown. In the fall of 1917 the cows were turned into this field and pastured quite readily on the new fresh growth of sweet clover, preferring it to the drier grass at the other end of the field. In the spring, however, the sweet clover grew more thickly and when the cows were turned in, other

common clover and other grasses were shorter and more tender and were readily eaten by the cattle but when forced to eat the young sweet clover they did so and produced milk abundantly from it. It seems to be a matter of education.

We have found sweet clover to do well on sandy land where it is difficult to get common clover to grow and we found it to do well on muck land where the same difficulty is experienced. To my mind, this is sweet clover's place. It is a splendid soil renovator and gives great tonnage per acre. It will not, I believe, make first-class silage on account of the chemical changes which take place after it is ensiled, reducing the feeding value.

I would not prefer sweet clover to alfalfa or common red clover, but would most assuredly grow sweet clover, where possible, where common red and alfalfa would not grow. I believe it has a place on many farms of this country, and I am in favour of recognizing it wherever it can be used profitably.

POULTRY EXTENSION WORK

PRINCE EDWARD ISLAND

BY WILFRID BOULTER, RURAL SCIENCE BRANCH

THE farmers of this province realize that the returns from poultry are the most remunerative for the money invested of any branch of their farm operations. This work is stimulated by an excellent system of grading and marketing the eggs as conducted by the P. E. Island Co-operative Egg and Poultry Association. This organization in addition to securing a high price for eggs, also buys live poultry at stated times during the year, and the average price paid the producer has been much above the average received from the local dealers. The local Department of Agriculture co-operated with the Egg and Poultry Association and assisted them in in-

stalling two Mammoth Incubators, each of 2,400 eggs capacity, in addition they provided a suitable room in which these machines were operated and supplied most of the help necessary to carry on the work.

The eggs used for hatching purposes were purchased from breeders of pure bred stock whose flocks had been selected and mated by the poultry expert, Mr. F. D. Marsh of the Poultry Division, Dominion Department of Agriculture and supplied by the Egg and Poultry Association.

About 6,000 day-old chicks were sold to the members of the Association at a very moderate price. The demand for chicks was enormous and there is a possibility that a machine

of 10,000 egg capacity will be installed for this season's output.

The Department also finances to a large extent a provincial poultry show. At this show an auction sale of birds is held and birds of good quality are disposed of to breeders throughout the province.

The demand for flock inspection is increasing and there is a decided inclination on the part of the people to improve the quality of their flock and produce for market the highest standard of both eggs and dressed poultry.

NEW BRUNSWICK

BY A. C. MCCULLOCH, POULTRY SUPERINTENDENT

THE work of the Poultry Division during the past two years has been almost entirely of an extension nature. No plant for experimental work is provided and no classes arranged for the teaching of poultry husbandry.

Stock improvement is a phase of the work calling for immediate improvement and on this our efforts have been largely focussed. Boys and Girls poultry clubs provide the medium through which the Poultry Division operates in introducing and distributing better stock and hatching eggs.

During 1919, eighteen poultry clubs were organized with a total membership of 222. There are at present thirty-six clubs with a membership of about 464. The majority of the club members secured in 1918 have disposed of all their previous mongrel or cross-bred flocks and substituted pure-bred flocks of heavy laying strains of Barred Plymouth Rocks. Other for various reasons have not succeeded in raising a sufficiently large flock of the better stock but hope to do so this year. The clubs organized in 1919 are developing in practically the same manner and at the same rate.

Each club member is provided with fifty hatching eggs or twenty-five day-old chicks of the heaviest laying strains available. Last spring 7,732 eggs and 1,290 day-old chicks were so distributed. The members are under contract to return to the Poultry Division in the fall of the year four chickens in payment of

the eggs or chicks received. With average success the member will have sufficient pullets in the fall for a small breeding pen the following spring and they are usually sufficiently interested to separate these from the balance of the flock and hatch from them only.

Each club holds a fair in September or October at which each member shows all birds raised. Premiums are paid not only on the quality of the birds but also on the number. At this time the official in charge selects from each member's flock the best cockerel, leg-bands the same and gives instructions that such bird is to be used for breeding the following spring. By this system the selection and mating of the member's breeding stock is under the direct control and supervision of the Poultry Division.

Four clubs were provided with day-old chicks instead of eggs last spring the object being to get the birds hatched and in the members' hands as early as possible. The plan met with only fair success. Possibilities for development in this regard depend largely upon transportation facilities. Several shipments were received with no loss whatever, others were absolute failures.

In addition to the foregoing over 8,000 similar hatching eggs were distributed to school children under the Division of Elementary Agriculture. Orders were received from breeders for about 3,000 more.

CULLING WORK

August and the early part of September are devoted to culling demonstrations. Wherever possible these are held in connection with the boys' and girls' clubs. If facilities permit the flock culled is divided into two groups according to their laying condition at the time. This appears to be the most satisfactory method of impressing the possibilities and advantages of the culling work upon the rural poultry raisers. The methods of arriving at the individual's previous production, her periods of rest and other related phases of culling work are likewise thoroughly discussed and illustrated. The development of the industry does not permit or justify extensive work along culling lines but in some sections it can be followed to advantage.

EDUCATIONAL EXHIBITS

Since the close of the war the annual fall agricultural exhibitions have been resumed. This Division prepared an elaborate educational exhibit to be staged at the same. Its function was to show the modern and approved methods recommended in the reproduction and maintenance of a 100 hen farm flock. At each exhibition an incubator hatched chicks and demonstrations were given on the removal of chicks to portable hovers and their care for the first two or three days. A colony house 6' x 8' was equipped with two portable hovers and the chicks given a large yard. A full size fattening crate explained the ultimate fate of surplus cockerels.

A small size, 8' x 8', permanent laying house illustrated a good type for farm use. The same house, in the size shown, is suitable for the average back-yard flock. This house accommodated a pen of ten Barred Plymouth Rock pullets of one of the best laying strains imported by the Poultry Division. The entire exhibit

was one of the strongest educational features of the exhibitions.¹

UTILITY POULTRY EXHIBITS

Boys and Girls Clubs contributed largely to the poultry exhibits their portion of the total displays ranging from twenty to twenty-five per cent. Many superior utility Barred Plymouth Rocks exhibited by these young enthusiasts suggested the possibilities of development in this line of work.

LAYING CONTESTS

Every effort is made to interest our breeders in the laying contests held in the various provinces. Two poultry club members and one other breeder participated in the Prince Edward Island contest last year with gratifying results. Their birds were from eggs imported by the Poultry Division. Eight pens are at present in the Nappan contest, the majority being of stock imported by this Division, and at present time are occupying the majority of the highest positions. These contests have served remarkably to arouse interest in poultry work and to prove the necessity of careful breeding and selection of high laying stock.

SUGGESTED LINES OF WORK

The phases of the work which at the present time appear to offer greatest opportunities are:—

1. Further application of the present methods for stock improvement.
2. Establishment of approved flocks among members of boys' and girls' clubs, to be under supervision of the Poultry Division and serve as breeding stations for future supplies of hatching eggs and breeding stock.
3. Encouragement of artificial incubation and brooding.
4. Laying contests.
5. Improvement in marketing conditions.

QUEBEC

BY M. A. JULL, MANAGER AND LECTURER, POULTRY DEPARTMENT

THE number of poultry can be increased and the poultry industry can be greatly improved through the organization of an efficient extension policy, which is the only means of enlightening the farmers as to the profitableness of a well-kept flock of fowls. The greatest need in Quebec is for the farmers to be told how to produce eggs successfully. The poultry business is just as sound a business as any other branch of farming and should be developed in proportion to the needs for eggs and poultry meat, which are very great indeed.

For a number of years, the Poultry Department of Macdonald College has been doing considerable extension work, as shown by the following list of the chief lines of work.

1. Considerable literature has been circulated, including bulletins, leaflets, circulars, and blue prints of buildings, appliances, and trap-nests.

2. The following numbers of settings of hatching eggs have been distributed to school children, free of charge:

1913, 100; 1914, 425; 1915, 610; 1916, 541; 1917, 658; 1918, 892; and in 1919, 740.

3. SCHOOL FAIRS—

The following numbers of School Fairs have been held: 1913, 3; 1914, 9; 1915, 14; 1916, 13; 1917, 21; 1918, 24; 1919, 25.

4. COMMUNITY BREEDING CENTRES—

Fifteen demonstration flocks serve as a source of supply for eggs for School Fairs and as community breeding centres in the distribution of eggs from improved flocks to the surrounding community. These flocks use as breeders, only pedigreed bred-to-lay cockerels from Macdonald College. The flocks are inspected twice each year and are culled in the fall.

5. DEMONSTRATION POULTRY HOUSES—

Six demonstration poultry houses were erected in 1913 in various places of the English speaking people of the Province. Using these houses as models, a large number of houses have been built by farmers.

6. DEMONSTRATIONS AND LECTURES—

A large number of demonstrations and lectures have been given at meetings of Poultry Associations and Farmers Clubs.

7. FATTENING POULTRY FOR MARKET—

This year a special effort was made to show the farmers the advantages of fattening and preparing poultry for market. Twelve demonstrations were given where farmers' birds were fattened, killed, plucked, and dressed. The attendance at these demonstrations was good and if they are carried on long enough will do much toward improving the marketing situation, which is anything but satisfactory.

8. SELECTING LAYERS AND BREEDERS—

One of the most important lines of extension work in poultry is the holding of demonstrations in selecting layers and breeders. The valuable work enables the farmers to cull their flocks and eliminate the non-producers and at the same time their best birds are saved as breeders for the next season. The Poultry Department contemplates putting on a large number of the demonstrations during the next few years. This will probably do more than anything else to get farmers interested in poultry keeping.

The various lines of extension work outlined above will be carried on for a number of years since it is believed that extension work is most efficient when applied consistently for five or more years.

MANITOBA

BY J. E. BERGEY, POULTRY SPECIALIST

ON account of the increased demand for eggs from Great Britain, the efforts of this department have been directed principally towards greater and more efficient production. Lectures were given at short courses, Institute meetings and at schools, and demonstrations at fairs as well as right on the farms.

The short courses were held during the winter months, between Nov. 15th and March 15th. Most of these were five day courses. On this work along with Institute meetings, two men were employed for the entire time. The lecturers confined themselves to practical every day problems in their lectures, and wherever possible visited any flocks conveniently located. A discussion of local problems would always bring out the information as regards the quality and condition of the poultry in that particular district. A good deal of disease was discovered in several localities, and assistance was given in an effort to stamp it out.

The average production in Manitoba is estimated at less than 70 eggs per hen per year. There is a big need for better bred and better selected stock. In order to help in selecting the layers from the loafers a series of culling demonstrations were arranged for during July and August. On account of the exceptionally early harvest we were unable to have most of them. Those that were held were very satisfactory.

In order to get better acquainted with the poultry breeders, and also to make a survey of the amount and quality of the pure-bred birds, an inspection was made of the pure-bred flocks. Over 400 flocks were visited. They varied from the very high-class exhibition birds to flocks of very poor quality. An encouraging feature was the freedom from disease in all the flocks.

In addition to the above, some work was done at boys' and girls' club fairs. In co-operation with the Department of Education a number of incubators were placed in schools of the newer districts. These machines were looked after by the teachers who lived right on the school grounds. Pure bred eggs were supplied for hatching. In this way we hope to introduce into these districts a large number of pure-bred flocks within a few years.

FORECAST

The 1920 activities will be a continuation of those followed in 1919. Special stress will be put on the culling demonstrations, and three months will probably be spent on this work alone. An effort will be also made to improve the quality of the market eggs sold in the Province. The establishing of poultry breeding stations for boys' and girls' club work will also be taken up.

ALBERTA

BY J. H. HARE, B.S.A., POULTRY COMMISSIONER

THE most important poultry extension work carried out in Alberta in 1919 was the putting in force of the new regulations governing the buying and selling of market eggs. Important results were also achieved by the school poultry clubs.*

THE ALBERTA ACT RESPECTING THE BUYING AND SELLING OF MARKET EGGS]

At the last session of the Alberta legislature an act was passed prohibiting the purchase or sale of eggs that are unfit for food.

*An account of the school poultry clubs appears in Part III of this number of The Agricultural Gazette.

The act also provides that first receivers or those who in a business way buy eggs from producers must candle the eggs they receive and reject any known as "heavy blood rings", "partially hatched eggs", "mouldy eggs", "black spots", "mixed rots", "addled eggs", or any otherwise unwholesome eggs.

PURPOSES OF LEGISLATION

The purpose of this legislation is to conserve the original freshness and good quality of that proportion of the eggs produced in the province which enter into trade. It gives protection to the consumer and added returns to the producer. The regulation is aimed directly at the bad egg but the greatest good is shown in the general improvement of the quality of the wholesome eggs brought about by the enforced revision of the egg producer's and egg handler's methods.

Bad eggs are not more plentiful in Alberta than in any other province but certainly their prevalence here, particularly in the summer months, is such as fully to warrant this direct action. One produce house reports that during the month of July, 1918, only four shipments out of a total of 135 received were free of bad eggs. The average number per case in the 131 shipments was 10.4. The wholesome eggs, as in nearly all shipments containing a like proportion of bad eggs, were largely of the lowest commercial grade and worth \$3 per case less than if they had been of the highest commercial grade.

In the first year of the operation of the act the Department concentrated its attention upon its enforcement among the wholesale dealers in the province. The majority of the wholesale dealers however have shown themselves to be entirely in sympathy with the act. At a meeting of the Alberta Produce Dealers' Association held in Calgary at the time the bill was before the legislature a resolution was passed endorsing the bill and asking for its enactment. For the most part the dealers adjusted

their methods of operation to the requirements of the act when it came into force. There were a number however who were negligent in the matter and for these it was necessary to resort to legal measures.

Toward the close of the egg season, according to the testimony of the produce dealers, current receipts were showing considerable improvement in quality as a result of the operation of the act.

SHOP-KEEPERS AFFECTED

It will be seen that the regulation affects the operation of the country storekeeper perhaps more than any other middleman. He is required to examine the eggs he buys and reject and decline to pay for any that are unwholesome. In the past storekeepers have recognized the justice and expediency of this but they declare that they have been unable to carry it out in practice because of the effect it would have on their trading in other commodities. Now, with the egg law in operation, and keeping an illustrated copy of the law before the view of his customers, the storekeeper refers to this as his authority for candling and deducting any that the act calls for. He informs the producer that he has no alternative in the matter, that all storekeepers are required to do the same and his action in the matter is for his (the producer's) protection as well as his own. The result is that no ill will is engendered and the next time the producer delivers his produce he sees to it that there are no unwholesome eggs to reject.

Without doubt the chief merit of the act lies in its operation at this point. Observation in both Canada and United States goes to show that under the old system of marketing there is more loss of quality on the farm than in the hands of all the middlemen combined. The Alberta act aims as far as possible to eliminate this loss at the source.

There are two inspectors in the field, one supplied by the Department of Agriculture and the other

by the Attorney General's Department. The government thought it advisable as far as possible to make use of men who covered the ground in other work and as an experiment one of the Attorney General's regular inspectors who possessed satisfactory qualifications was selected to assist in the work. Thus far the experiment has proved a decided success.

The inspector who is attached to the Department of Agriculture has also other duties to perform for his Department but special attention by both inspectors is given to the enforcement of the Egg Act during those months when unwholesome eggs are most plentiful, June, July, August and September.

NOVA SCOTIA

DRAINAGE OPERATIONS

BY DR. M. CUMMING, B.A., B.S.A. SECRETARY FOR AGRICULTURE

THE Department of Agriculture of the Province of Nova Scotia has not carried on as aggressive a drainage campaign since the beginning of the war as before that time. A strong Department had been built up prior to the war under the superintendence of the late Lieut. B. H. Landels, who was killed in action at the Somme. We had hoped to have him back and to continue the Department under his direction. In the interim the price of tiles and the cost and difficulty of securing labour have led farmers to cut down their drainage operations. For the past year our work has been confined to conducting drainage surveys for such as made application for the same. For the current year this has included a survey of only five farms, comprising 1,225 acres.

I may add that in addition we operated a drainage machine in Pictou county for the greater part of the season and put in several thousands rods of drains with this machine. However, we have been confronted with great difficulty in carrying on power drainage in the fact that under conditions prevailing in Nova Scotia where the land is rolling and where one or two drains will accomplish a large amount of work, we get such small contracts on individual farms that it is difficult to operate the drainage machine on anything approximating a paying basis.

We are hoping, however, if the price of tile gets back to something like a former basis and if labour on the farm gets a little more abundant, we will be able to back up a much more active drainage campaign.

AGRICULTURAL ACTIVITIES

BY J. G. ARCHIBALD, B.S.A., AGRICULTURAL COLLEGE, TRURO, N.S.

THE annual short course at the Nova Scotia Agricultural College has proven an outstanding success. On account of high cost of board and transportation the authorities were somewhat hesitant in announcing a short course this year, but an enrolment of one hundred and forty and an attendance frequently passing the two hundred mark go to show that interest in this

important annual event has by no means waned.

The usual programme was varied somewhat, the course being divided into a "Big Four Days" from Jan. 6th-9th inclusive, and a continuation course from the 10th to the 16th for those who wish to get more specific information along the lines they might be interested in. Of the one hundred and forty who took the

first four days, thirty have remained for the rest of the course, besides a class of fifty returned soldiers.

HONORS AT MARITIME WINTER FAIR

The Agricultural College entered both sheep and dairy cattle in their respective classes at the Maritime Winter Fair held in Amherst from Dec. 15th to 18th, on the understanding that if prizes were taken only the ribbons would be accepted, the money going to the next highest competitor.

The following prizes were won:—

Hampshire breeding ewes, 1st and 2nd.

Hampshire ewe lambs, 1st and 2nd.
Holstein—3 yr. old heifer, 3rd, Dairy test.

Ayrshire—4 yr. old cow, 1st, Dairy test.

This last mentioned cow, Gardrum White Floss, besides being first in her

class, was grand champion of all breeds and ages. She produced in 72 hours, 198.1 lbs. of milk containing 8.74 lbs. of fat and 17.49 lbs. of solids not fat. Her total score was 270.97 which is the highest ever made by an Ayrshire at Amherst and probably the highest by this breed at any public show in Canada. This cow was bred and raised on the College farm and besides being a great producer is a magnificent show cow.

DEPARTMENT OF CHEMISTRY

The series of experimental fertilizer plots referred to in the GAZETTE for June, 1919, were carried through the season quite successfully and results from the first year's work are now available. While it would not be wise to draw any definite conclusions so soon, yet we feel that the results for this year may show what is being done and they are given herewith for what they are worth.

	Average of 12 plots in Different parts of Province	Gain over Average of two checks
1. Acid Phosphate.....	44.3	5.7
2. Basic Slag.....	45.5	6.9
3. Check.....	39.9	
4. Limestone (3 tons).....	40.5	1.9
5. Limestone (3 tons) and Acid Phosphate.....	46.75	8.15
6. Limestone (6 tons) and Acid Phosphate.....	48.5	9.9
7. Mixed Fertilizer (3-10).....	45.4	6.8
8. Mixed Fertilizer and Limestone.....	49.8	11.2
9. Manure.....	42.9	4.3
10. Manure and Limestone.....	48.4	9.8
11. Check.....	37.3	
12. Manure and Slag.....	50.6	12.0
13. Manure, Acid Phosphate and Limestone.....	51.8	13.2
14. Acid Phosphate and Limestone.....	47.4	8.8
Average of 2 checks.....	38.6	

These yields show the effect of limestone, phosphates and manure when applied alone and in combination. The striking fact in connection with the work thus far is that, without exception, the increase on the plots where two or more materials were combined, over the check plots

was greater than the sum of the increases on the plots which received the corresponding materials singly.

Using these figures as a basis, the Department of Chemistry prepared an exhibit and occupied a booth at the Maritime Winter Fair at Amherst. Samples of sheaf grain to show

comparative height and stoutness of straw, and glass tubes filled to varying heights with the threshed grain to show comparative yields on the different plots, were placed on exhibition. Approximately, one hundred interested farmers visited the booth and discussed problems relating to soil fertility.

CREAMERY DEVELOPMENT

The two government creameries situated respectively at Baddeck and Margaree Forks on Cape Breton Island report a most successful year and a large increase over 1918 in volume of business done.

BADDECK

1918—Butter manufactured—37,309 lbs., value \$17,780.

1919—Butter manufactured—59,443 lbs., value, \$32,968.

MARGAREE

1918—Butter manufactured—31,334 lbs., value, \$14,225.

1919—Butter manufactured—52,977 lbs., value, \$28,945.

These creameries were started several years ago and results for a time were rather discouraging, but judging from the above statement the venture was well worth while. The influence of the creamery is also being seen in improved dairy herds, increase in land values, and better rural conditions generally.

NEW BRUNSWICK

PROGRESS IN BEEKEEPING

BY L. T. FLOYD, PROVINCIAL APIARIST

THE past year has been one of decided advancement in apiary work in New Brunswick, the results have been greater than was anticipated by the most enthusiastic beekeeper in the province. These results were achieved partly because of the favorable wintering conditions during the winter of 1918-1919 but chiefly because of the awakened interest in the industry which caused the beekeepers to prepare for the honey crop by having the required equipment in readiness for the honey flow.

On the previous years the visits made by the apiarist and the demonstrations held had the results of interesting a man here and there in the matter of modern equipment. These men were thus enabled to adopt modern methods and the crops secured were a great surprise, the news soon spread to others, consequently there was a great increase in the demand for assistance.

The crop reports for 1919 show a decrease in one year of 25% in the

production of comb honey and an increase of 150% in the production of extracted honey. As the methods introduced were used only in extracted honey production, the results are highly gratifying.

Every case of American Foul Brood treated in 1918 was inspected in 1919 and found to be cured.

The largest daily gains from one hive was reported from the Experimental Farm, Fredericton, where a hive on scales gained 58 pounds in four days as follows:—June 24th, 11 pounds—25th, 21 pounds—26th, 16 pounds—27th, 10 pounds. The best apiary reported 1,795 pounds from twelve colonies and increased to seventeen colonies. The best individual hive reported 240 pounds from one hive, the product of one queen.

The average report for the province 45 pounds per hive but it must be remembered that we still have hundreds of box hives that interfere seriously with our average figures.

Because of the increase in production, honey is now offered for

sale in nearly every grocery store in Fredericton and St. John as well as many of the smaller towns. The shortage of sugar has been a real blessing to the beekeepers in sections where the crop was large as it stimulated the sale more than any other agency.

The Beekeepers Association handled supplies to the value of \$1,452, thus effecting a saving of 10% on supplies and 25% on containers.

No account is taken of locally manufactured supplies. Several co-operative shipments of wax were made to Brantford, Ontario, to be manufactured into foundation as no

factory in New Brunswick is equipped for that purpose. Experiments in outside packing were entirely successful. Buckwheat hulls and dry oat chaff gave decidedly better results than planer shavings.

Demonstrations held in July were much better attended than in the previous year as the advertising from the year before helped greatly in the second years' work.

It was found that a system of one page circular letters mailed out at a time when advise on the subject treated was seasonable had a decided advantage over the bulletin method of supplying information.

ONTARIO

NEW BUILDINGS AT THE ONTARIO AGRICULTURAL COLLEGE

BY S. H. GANDIER, B.S.A., SECRETARY.

FOR several years before the war, the need of expansion in residence, class room and laboratory space at the O.A.C. was keenly felt. Plans for several buildings were completed in 1914 but building operations were delayed until 1919 because of the war. Three buildings are now in course of construction.

MILLS HALL

Before the war it was impossible to accommodate more than half of the regular student body in residence. This year there are 570 regular students in agriculture at Guelph and the old dormitories will handle only 248. The majority of the remainder have rooms in the city two miles distant.

Ground for a new dormitory was broken in July, 1914, but building was immediately postponed when the war commenced. Operations were begun in earnest in May, 1919, and "Mills Hall", so named in honour of Dr. James Mills who was President of the college from 1879 to 1904, is now beginning to show its limestone walls above the spruces on the main drive at the north side of the campus.

Work has been slow on account of shortage of labour and building material. It is expected, however, that the building will be completed early in the summer and equipped in readiness for the students next September.

Mills Hall is an "L" shaped building of three stories with wings 153 ft. and 115 ft. respectively. The walls are of Credit Valley lime-stone with grey sandstone trimmings. It will contain 68 rooms with accommodation for about 175 students. Each flat will have baths and lavatories and all appointments will be most modern. The floors of the corridors and entrance halls will be of re-inforced concrete, tiled with red quarry tile, and the walls of pressed brick to a height of 5 feet, with stucco above. On the ground floor is a common room 29 ft. x 43 ft. This room will be in oak panelling with panelled ceiling. An open hearth fireplace and a splendid outlook on the main campus will add to the attractiveness of this room.

The architecture is scholastic gothic and the structure, when completed, will be one of the handsomest on the college campus. The cost is

estimated in the neighbourhood of \$150,000 not including equipment.

THE APICULTURE BUILDING

The Department of Apiculture up to the present, has occupied a part of Macdonald Institute. Not only is this arrangement unsuited to the needs of the department, but it has also cramped the quarters of the Domestic Science Department. The new building now in course of construction is situated across the car tracks at the south side of the campus. It is built of red brick, two stories high with stone basement. The dimensions are 64' 6" x 47' 3". The basement will be specially insulated for wintering bees. Laboratories for practical and scientific work and class rooms will occupy the two main floors. This building will be ready for occupancy before next

autumn. The sum of \$40,000 was voted for its erection.

THE PIGGERIES

The new piggeries are almost completed and will greatly facilitate the work of the Animal Husbandry Department. This building is on the north side of the lane east of the farm barns. The old buildings which are many years out of date, will be torn down. The new building is 120 ft. x 32 ft. The walls are of concrete to a height of four feet with clap board above. The floors are concrete and the roof is finished with metal shingles. All interior equipment such as partitions, troughs, etc. will be of steel. Litter carriers and other conveniences will be installed. These piggeries are being erected at a cost of about \$8,500.00.

JUDGING COMPETITIONS AT GUELPH

THE regular intercounty live stock judging competition which annually takes place at the Ontario Provincial Winter Fair was this year held at the College instead of the Winter Fair buildings. Teams from twenty-one counties contested for the J. S. Duff trophy. There were three men to each team and they were required to judge two classes of beef cattle, dairy cattle, sheep, swine, and horses giving reasons for their placings. The competition was under the direction of R. S. Duncan, Supervisor of agricultural representatives, and the judges were Prof. Wade Toole, Ontario Agricultural College; J. P. Sackville, Ontario Agricultural College; W. J. Bell, Kemptville Agricultural School, and E. G. Gordon, Department of Agriculture, Toronto. The possible total of points was 3,000 and the winners in the competition are as

follows—1st, Oxford, 2,365 (team composed of Burns McCorquodale, John Blair, and Max Butcher, all of Embro); 2nd Waterloo, 2,332; 3rd York, 2,239; 4th Victoria, 2,210; 5th Halton, 2,179; 6th, Durham, 2,178; 7th Essex, 2,156; 8th Grey, 2,125; 9th Brant, 2,121; 10th Wentworth, 2,059; 11th Wellington, 12th Bruce, 2,018; 13th Peel, 2,018; 14th Middlesex, 1,984; 15th Lambton, 1,983; 16th Huron, 1,937; 17th Ontario, 1,903; 18th Lincoln, 1,884; 19th Simcoe, 1,863; 20th Norfolk, 1,834; 21st Welland, 1,571.

In the college interyear judging competition for the G. E. Day trophy the results were as follows: 1st—Fourth year with 4,528 points; 2nd—First year with 4,461 points; 3rd—Second year with 4,336 points and 4th—Third year with 4,202 points.

MANITOBA

PROGRESS OF THE DAIRY INDUSTRY

BY L. A. GIBSON, DAIRY COMMISSIONER FOR MANITOBA

WE have 44 creameries in Manitoba, with 22,000 milk and cream shippers. Notwithstanding the high price of all feeds, the present indications for increased production of dairy products in Manitoba are exceedingly encouraging.

During the year 1919 a number of new silos were erected in different parts of the province, which have been filled with corn, green oats and peas. This makes a good, succulent, cheap feed for milch cows. The total value of dairy products for the year amounted to \$16,789,892.51. The increased production, combined with the increased price, amounted to \$5,001,719.25.

It is encouraging to report this progress in dairying, even with the shortage of labour, high grain prices and unsettled labour conditions. The increase in dairying is more noticeable in the southern part of the province, where grain growing has been carried on for 25 or 30 years. There appears to be a marked change towards more mixed farming in this part of Manitoba.

PRIZES WON AT EXHIBITIONS

During 1919 a few of the Manitoba creamery buttermakers exhibited

butter at Edmonton, Calgary, Winnipeg and Brandon, and they were successful in winning 51 prizes, made up of 3 championships, 1 reserve championship, 9 firsts, 5 seconds, 8 thirds, 9 fourths, 5 fifths, 5 sixths, 3 sevenths and 3 eighths. They have won the Championship Cup at Toronto two years in succession for the highest scoring butter, in competition with the whole of Canada. They also won 3rd at the National Dairy Show, Chicago, last October, in competition with the whole of the United States.

Owing to the war, the dairy herds of Europe have been greatly depleted. This fact, combined with the difficulty of getting concentrated feeds for the milch cows, has produced an abnormal export demand for our surplus dairy products. This export demand will continue for at least another three years, with high prices for all dairy products. This gives us an excellent opportunity to introduce our products.

The following table gives the quantities, average prices and values of milk and milk products produced during the year 1919:

Product	Pounds	Price	Total Value
		cts.	\$ cts.
Creamery Butter.....	8,256,711	54	4,458,623 94
Dairy Butter.....	10,804,225	44	4,753,859 00
Cheese.....	679,855	26.4	179,481 72
Total.....	19,740,791		9,391,964 66
Milk.....	150,625,021	3.9	5,874,375 81
Sweet Cream in lbs. Butter Fat.....	2,457,342	62	1,523,552 04
			16,789,892 51

WEED ERADICATION

BY S. A. BEDFORD, CHAIRMAN, WEEDS COMMISSION

THE success of the Noxious Weeds Act enforcement depends largely on the class of man selected for the position of Municipal Weeds Inspector. Some of the best inspectors are men past middle life, men who were a success on their own farms and who understand the farm problems of the municipality. The best results are obtained when the reeve and councillors take a personal interest in the inspector and his work. The treatment of the council towards their inspector will be reflected in the support he gets from the other farmers. The inspectors are appointed for five months, and each is supposed to devote his whole time during that period to the work and to visit every farm in his district. Each inspector is required to fill out an annual report on forms approved by the Government, one copy to be sent to the Weeds Commission and the other deposited with the secretary treasurer of the municipality. This last copy is for the perusal of the taxpayer of the district. It also proves useful as a guide for next year's inspector. These reports include the acreage of each kind of grain and grasses on the farms and also the acreage in summer-fallow. This report also shows the condition of the land from a noxious weeds standpoint and states what steps were taken towards the eradication of any weeds that may have taken possession of the land.

DUTIES OF WEEDS COMMISSION

The Weeds Commission of the Manitoba Department of Agriculture consists of three members, one of which acts as chairman. Their duties are defined in the Noxious Weeds Act. The commissioners collectively decide upon all matters of policy, but divide the province for purposes of summer oversight, thus establishing a continuity of connec-

tion with local situations. Each member of the commission visits each municipality in his district at least once during each summer, and frequently a number of visits are found necessary for some municipalities. While on these tours the commissioner is always accompanied in each successive municipality visited by the local Municipal Weeds Inspector. This personal visitation of each municipality gives the commissioners an opportunity of getting first hand information regarding the weed problem in the district, keeps them in close touch with the farming interests of the province, and enables them to assist and advise the Municipal inspectors.

The Commission has to deal with a very varied class of land owners and occupiers, homesteaders on new land, old settlers, resident and absentee landlords, speculators, large land owning companies, also tenants, good, bad and indifferent, as well as railroad companies and other corporations.

WEEDS CLASSIFIED

The character and extent of the weeds also vary greatly in the different districts, and the cultivation must be adapted to the class of weeds found growing there. The Weeds Act recognizes the fundamental difference in weeds which threaten rapid and certain spread by wind, and those which, spreading more slowly, offer less of a menace to the community. The Act thus defines classes 1 and 2, and the requirements laid upon the land occupier in dealing with these are quite different. To class 1 belong: Perennial Sow thistle, Canada thistle, Russian thistle, tumbling mustard and toad flax. The Commission aims to eventually eradicate all weeds of class 1 in western Manitoba, and to get the same weeds under control in the Red River Valley and other parts of eastern Manitoba.

Extreme measures may be enforced against these, such as the cutting down of a badly infested crop of grain.

EDUCATIONAL CAMPAIGN AGAINST WEEDS

The visits to the different municipalities during the summer months are supplemented by educational meetings conducted by the members of the Weeds Commission throughout the fall and winter months. These addresses are illustrated by lantern slides showing the different varieties of weeds and the most approved methods for their eradication. There has been an unusual amount of interest shown this winter so far regarding these meetings. This is evidenced by the many applications for meetings received from grain growers' associations, farmers' institutes, etc. At these meetings attending farmers are invited to give their experiences with the different weeds. This information gathered direct from the farmers is highly valued by the Commission. At a number of these meetings the senior boy pupils of the different schools are in attendance and these future farmers of the province appear to take a deep interest in the subject of noxious weeds, and we trust that their retentive memories will retain many of the suggestions thrown out by the speakers.

LOCAL SEASONAL CONDITIONS

The past season has been an unfavourable one from a noxious

weed eradication standpoint. The Red River Valley and adjacent territory has an excess of rainfall in June. This prevented many of the farmers from summer-fallowing at the proper time, and we fear that the late working of these fallows will result in a very weedy crop next year.

The greater portion of the province suffered from rust, which somewhat reduced the yield and hastened the cutting of grain, leaving very little time between seeding and harvest for the cultivation of summer-fallows. An early freeze up also had a tendency to reduce the amount of fall plowing. The above conditions all combine to make it extremely difficult to control the spread of noxious weeds.

There has been a rather serious outbreak of Russian thistle this fall, principally in the south-western portion of the province. Members of the Weeds Commission have spent several weeks in these infested districts in endeavouring to get this decidedly noxious weed cleaned up, but we find it an exceedingly difficult weed to eradicate, especially when the soil is light and the rainfall as limited as it was in the southwestern portion of the province this year.

In spite of the above drawbacks the work of the Weeds Commission is becoming increasingly appreciated, and in some parts of the province there is a noticeable decrease in the number of noxious weeds found on the better class of farms and a large amount of accurate information is being distributed regarding noxious weeds and the most approved method for their eradication.

SASKATCHEWAN

PROGRESS IN DAIRYING

BY W. A. MACLEOD, EDITOR OF PUBLICATIONS

IN his Annual Report for the year closing April 30, 1919, Percy E. Reed, Dairy Commissioner for Saskatchewan shows the remarkable increase of 18.70% for the Province in dairy production. This report

is particularly gratifying in view of the fact that there was a slightly reduced output reported in 1917 and an actual decrease of 1,414 in the number of milch cows.

This decrease in the number of

cows milked, Mr. Reed estimates, is due largely to the labour shortage, and the increased dairy output constitutes a striking proof of what has been done to improve the dairy cow in Saskatchewan, and by better feed and care, to increase their average output.

While 1918 prices were in advance of any previous year a still higher standard has been established during the period covered by this report both for average and maximum prices. The average wholesale price received by Saskatchewan manufacturers for their 1918 output was 44.34c. per pound. In March, 1918, a carload of butter was shipped out of the Province for which 59c. per pound was received. This is the highest price reported to the Dairy Branch and probably the highest price ever received by a Saskatchewan manufacturer for a car lot of butter.

QUANTITIES FOR EXPORT.

With the rapid increase in production in recent years there has been a corresponding increase in the amount of butter for sale outside of the Province. The importance of the creamery industry from a business standpoint is demonstrated by the remarkable growth, of the creamery industry. During 1918, after supplying the home trade with approximately 97 cars, 2,425,000 pounds of creamery butter remained for sale to outside markets. This amount was about equally divided between the markets of eastern and western Canada. Previous to the last two or three years practically the whole exportable surplus was sold on the Pacific coast, but owing to the unusual demand of the eastern market a considerable percentage of Saskatchewan butter has been shipped to Montreal and Toronto.

The value of the 97 cars sold to outside markets in 1918 was approximately \$1,215,000. The average price per pound ruled several cents higher than in 1917 and this increase in price together with the increase

in the quality of butter shipped out brings the total value of Saskatchewan's creamery exports for 1918 up to \$330,000 in excess of 1917.

LOANS TO CREAMERIES.

Loans aggregating \$34,600 have been allowed by the Provincial Government to seventeen Co-operative creameries at various points in the province under the terms of the Dairymans' Act of Saskatchewan. Ten of the seventeen loans have been repaid in full with interest, and all accounts of both principal and interest have in every case been promptly paid when due.

NEW CREAMERIES.

During the season of 1918 four new creameries were established in Saskatchewan. A creamery at Carlyle and another at Swift Current, by the Saskatchewan Creamery Co., Ltd. of Moosejaw; a creamery at Norquay, by the Norquay Creamery Co., and one at Moosejaw, by P. Burns & Co., Ltd. There were in operation in the province thirty-eight creameries, twenty of these co-operative plants being operated by the Saskatchewan Co-operative Creameries Ltd., and the remaining eighteen privately owned and operated.

In addition to these new creameries being established a creamery formerly operated at Watson, but which has been idle for several years was reopened and a very satisfactory season's business reported. The creamery of Saskatchewan, the only branch of dairying in which complete figures are available, shows an investment in plants and equipment of \$897,149.11. The total quantity of creamery butter manufactured in 1918 was 5,009,014 pounds.

DAIRY STATISTICS

The estimated value of the products of the various creameries is as follows:—

Wholesale value of butter manufactured.....	\$ 2,221,403.00
Wholesale value of ice cream manufactured.....	345,522.30
Wholesale value of milk handled.....	431,265.03
Wholesale value of cream...	169,375.86
Wholesale value of butter-milk.....	13,056.54
Total.....	\$ 3,180,622.73

Definite figures are not available as to dairy butter manufactured, and there are many retail dealers in ice cream who do their own manufacturing, while only an approximate estimate can be made of the milk and cream consumed by the rural population, and as none of these items are included in the above statement the business turnover shown above represents less than one-third the value of the total dairy products of Saskatchewan for the period covered by this report.

During 1918 there were 19,246 farmers in the province enrolled as patrons of creameries, either directly or through creamery buying stations. The daily or fortnightly cream or milk cheque does much to stabilize business throughout the entire year in the district served by creameries.

The total number of milk cows in Saskatchewan 1918 was 353,989.

PROGRESS OF CO-OPERATIVE ORGANIZATIONS.

Plenty progress has been made by The Saskatchewan Co-operative Creameries Co., which was formed in 1917, by the amalgamation of sixteen Co-operative Creamery Companies, under the provisions of The Saskatchewan Co-operative Creameries Act. Under the terms of the Act the Company has the power in addition to operating creameries, included in the original organization,

to construct, acquire, maintain, and operate creameries which have factories or cold storage plants. The Company now operates twenty creameries and has purchased two cold storage plants at Regina and Vonda, respectively, and erected two new cold storages, one at Saskatchewan, and the other at North Battleford. All of these plants are fully modern, and are equipped with mechanical refrigeration, of a proven type. Several cold storage plants owned by the Company contain a total of approximately 250,000 cubic feet of refrigeration space.

During 1918 six co-operative organizations manufactured 2,870,683 pounds of butter, and handled 112,947 pounds of poultry. These birds were purchased alive from farmers and were dressed at the Companies cream stations. They also purchased direct from the producers 5,780 cases or 173,506 dozens of eggs, in addition to a large turnover in cold storage business.

While the co-operative movement has made remarkable progress in dairying lines in Saskatchewan, private enterprise has also done much towards the developing of this branch of Agriculture. The eighteen privately owned creameries in operation during 1918 manufactured 213,833 pounds of butter or 42.68% of the total creamery butter of the Province. Five plants in the milk trade report a business turnover of \$235,647.79, seven plants sold sweet cream to the value of \$101,293.23, and six of the Companies manufactured ice cream, the value of this commodity being \$241,644.00. The total business turnover, in strictly dairying products manufactured from the raw material purchased from the farmers of these eighteen creameries, amounted to \$1,551,034.98.

LIVE STOCK YARDS OPERATING

BY W. A. MACLEOD, EDITOR OF PUBLICATIONS

THE Minister of Agriculture for Saskatchewan, the Hon. C. A. Dunning, has decided to place

purchasing agents at the Southern Saskatchewan Live Stock Yards at Moosejaw and the Northern Saskat-

chewan Co-operative Live Stock Yards at Prince Albert. A. J. Clark and J. H. Ross, the purchasing agents for the Live Stock Branch of the Department of Agriculture, will be sent to these points for the winter months. At both of these Co-operative stock yards, which have been operating for some time, large quantities of stock are being handled and the buyers stationed at these two centres will be able to purchase young breeding animals required in the carrying out of the department policy of supplying the farmers of the province with young breeding stock on credit terms. These buyers will also become acquainted with the conditions in the territory tributary to the market, and besides selling the young stock purchased, to farmers for feeding and breeding, they will encourage the formation of co-operative shipping associations and act in an advisory capacity at the stock yard.

Prince Albert and Moosejaw are shipping cattle by the train load from the new co-operative stock yards which are now open to full capacity and are ready to handle consignments

of live stock from all parts of the province. Prince Albert Co-operative Stock Yards have been operating for several months and the Stock Yards Company at Moosejaw made its formal opening announcement on November 19. Commission men from Winnipeg are stationed at Moosejaw, and at the northern yards are buyers representing several packing companies. Arrangements are being made between the executive of the two stock yards by which the overflow of stock from one yard may be handled at the other and co-operation between the two can be secured. A blanket insurance policy on live stock in the yards will be carried.

The provincial government of Saskatchewan is paying one-third of the cost of construction and the companies are raising the other two-thirds of the cost. The modern equipment at both stock yards provides the utmost comfort for the stock and this new development of co-operative enterprise in Saskatchewan promises exceedingly good results in building up the live stock industry of the province.

HORSE SALES BEING ORGANIZED

BY W. W. THOMPSON, B.S.A.

THE co-operative organization branch has already commenced the organization of horse sales or "markets" for the coming spring. Several of these sales were held last spring and were not so successful in some ways as had been hoped they would be. Some of the entries were not up to standard quality and the prices demanded ranged high. One of the reasons, however, why the sales were not more successful last spring was the lateness of the season when they were held. Steps were therefore taken early this season to have the sales held before the spring routine on the farms would interfere with them. Circulars were sent out to likely centres and already replies

have been received from nine districts stating they will hold sales this spring. This is regarded by the branch as exceedingly encouraging since only eight sales in all were held last spring. With many districts still to be heard from it is expected that the number of sales eventually held this spring will be a substantial increase over those held in March and April last. The Department of Agriculture places a good deal of faith in the future of these sales as a medium for bringing horse breeders and horse buyers together and thus solving in a measure one of the problems resulting from the present surplus of horses in this province.

BRITISH COLUMBIA

SEASON'S BUTTER COMPETITION

BY T. A. F. WIANCKO, PROVINCIAL DAIRY INSTRUCTOR

THE second season's butter competition carried on by the British Columbia Dairymen's Association has recently been judged, and the awards placed. The Association for several years past has realized the necessity of improvement in keeping quality, flavour and workmanship, in British Columbia creamery butter, in order to keep pace with that which is being imported from the Prairie Provinces. Butter from these points is of a uniformly high keeping quality and mild, sweet flavour, and this has been brought about very largely by a system of careful cream grading and selection, together with efficient pasteurization at high temperatures to insure long keeping quality. It was thought that by instituting a series of competitions in British Columbia extending over a number of months each year, that great advancement would result, and in this the association has not been disappointed.

The 1919 competition was carried out along very similar lines to that of the previous year, and was open to all British Columbia creameries. Entries consisted of one 14-pound box of butter, solid packed, salted, to be made between the 1st and 15th of each month, and sent to cold storage, as directed by the secretary not later than the 20th of the month, to be held there until judged at the end of the season.

By extending the competition over a number of months, an opportunity was afforded to ascertain the relative keeping qualities of the butter put up during the different months of the season, and at the different creameries. Detailed records of each churning of butter from which the exhibits were made were kept for the purpose of reference and comparison. These records supplied such data as pasteurizing and churning temperatures, acidity, flavour and condition of cream before churning, tempera-

tures of wash water, loss of fat in the buttermilk, percentage of moisture in the finished butter, length of time in working the butter, percentage of over-run, etc. These churning reports are being tabulated in detail and together with the judges scores of each exhibit will furnish each contestant with a great deal of valuable information, not only as regards his own work, but of that of each other competitor.

BUTTER JUDGING COMPETITION

It was proposed by the association to hold representative boxes of the butter over until the time of their annual convention, which was held in Vancouver on January 20 to 22, in order to give the competitors and other creamery men of the province an opportunity to study and compare them. It was also proposed to arrange for that occasion a butter judging competition in which competitors during the season will be given an opportunity of comparing their skill as judges of butter with that of the official judges of the competition, and this in itself is of considerable educational advantage, in that it tends to fix uniform grade standards for butter according to present day market requirements in British Columbia. A generous prize list for winners in this competition will be arranged. Mr. A. P. Slade of the firm of A. P. Slade & Company, Wholesale produce dealers, Vancouver, who is considered as one of the best judges of butter in Canada, assisted by Mr. W. W. Moore of Messrs. Moore & Patton, wholesale produce brokers, placed the awards in the season's competition, and Mr. Slade kindly consented to be present at the butter judging competition to address the creamerymen and present a brief report upon what in his judgment were the outstanding features of the competition recently ended.

PART III

Junior Agriculture

DEMONSTRATIONS, COMPETITIONS, AND CLASS-ROOM STUDIES IN RURAL
LIFE FOR BOYS AND GIRLS

PRINCE EDWARD ISLAND

SCHOOL POULTRY CLUBS

BY WILFRID BOULTER, RURAL SCIENCE BRANCH

THE Department of Agriculture through the Rural Science Branch is encouraging the boys and girls of the public schools to take a greater interest in poultry. The method followed in 1918 was to organize school poultry clubs at school fair centres. The objects of these clubs were:

1. To stimulate an interest in poultry raising among the people of the province.
2. To give a better knowledge of the value and importance of the poultry industry, and in marketing of a first class product.
3. To teach better methods of caring for the poultry and eggs.
4. To show the increased revenue to be derived from well bred poultry where proper methods of management are pursued.
5. To encourage the child to be become a producer early in life.

The members of the club decided upon one particular breed of poultry. Each member purchased a setting of eggs from the Rural Science Department. These eggs were from pure bred selected flocks. Unfortunately the pupil did not always receive the eggs in good condition, and as a result experienced poor hatches.

To overcome this and to give the members a better prospect for building up a flock, the Department installed a Mammoth incubator with a capacity of 2,400 eggs. Two incubators of the same type were installed by the Co-operative Egg and Poultry

Association, and a man engaged to operate the three machines. The eggs were all secured through the Association and only those used which were from selected flocks. The announcement was made to the schools that day old chicks would be delivered to the clubs first making application. So favourably was this announcement received that in all 12,000 chicks were ordered. The Department followed its regulation, and those first ordering were supplied. Hundreds of pupils were disappointed because of our inability to fill the orders. The experience gained will enable us in next year's operation to avoid many of the errors made. The boys and girls exhibited their poultry at the school fairs and at the Provincial Poultry Show held in Charlottetown. The experiment has already shown that it is worth while to work through the schools.

If we wish our boys to leave school for the farm keenly interested in live stock, it is necessary to begin educating them along these lines at an impressionable age. The various ways in which this education is carried on in some of our schools and the practical results obtained is sufficient evidence that a greater effort should be made to have all our rural schools actively interested in leading our young people to see the prosperous future open to intelligent farmers and that the greatest prosperity rests on the development of our live stock industry.

NEW BRUNSWICK

RURAL SCIENCE SCHOOL

THE Rural Science School will be held as usual at Sussex, during July and August. Plans are being made to make this both pleasant and profitable. Suggestions have already been made by some who attended the school last summer, as to methods of instruction, by combining work and recreation.

A bonus is paid to those who after successfully completing this course, teach the subject with school gardening, the year subsequent to attendance at the school. A grant is also paid as well as travelling expenses one way to the school.

MANITOBA

SCHOOL AND HOME GARDENS

REPORTS from eleven inspectorates of the public schools in Manitoba are unanimous regarding the general decline in school gardening activities in that province. They point out that the failure of this project is due to several causes which must be contended with throughout all the rural municipalities. The greatest obstacle appears to be the long summer vacation during which time there is no one to attend to the gardens on the school plot except, in a few cases, where resident teachers give personal attention to the garden during the vacation. The weeds are allowed to grow up and the result of the spring sowing and cultivation becomes only an eyesore to the public. The second difficulty met with has been one of water supply which is a drawback in all cases even in those where resident teachers are putting forth an effort. The third difficulty is a lack of co-operation from the trustees. They are not always in sympathy with the movement and do not lend it their support. Besides these major difficulties there are others to contend with. The ravages of gophers and other pests are an annoyance and the frequent change of teachers experienced in many municipalities can only result in a loss of interest in the movement.

HOME GARDENS

However, the pupils do not seem to be suffering as a result of the handicaps in connection with school gardens. Throughout the province boys and girls clubs have been organized and are doing excellent work in the preparation and cultivation of home gardens under the supervision of the teachers in the various inspectorates. These home gardens are taking the place of school gardens and are being efficiently conducted under the auspices of the above-mentioned clubs with the aid and supervision of the rural teachers. The home gardens are better suited to the prairie conditions, and the difficulties which are met with in school gardens do not appear to be effective in them. The children usually secure a corner of the home garden and carry on their activities in it, giving personal attention to their special plots and raise vegetables, etc., in competition with their parents.

At many of the school fairs there are contests for the products of the home garden and the entries are usually numerous and the exhibits are of an excellent quality. The consensus of opinion, as expressed by most of the inspectors, is decidedly in favour of home gardens under the supervision and direction of the

teacher, for Manitoba conditions. They claim in further support of this practice that the rural teachers are thus brought into closer contact with the home conditions of their pupils and a keener mutual interest

is taken. This can best be brought about by the school garden system. These considerations to some extent make up for the teaching value and common interest provided by the properly conducted school garden.

SASKATCHEWAN

ELEMENTARY AGRICULTURAL INSTRUCTION

BY F. W. BATES, M.S.C., DIRECTOR

THAT some form of agricultural instruction should be provided in our elementary school has long been recognized but as yet the problem of how best to attain the end desired has not been completely solved. In view of the experience gained, however, it should be possible to discover a few general principles for use in further work.

Agriculture has been included in the course of study for the schools of Saskatchewan for many years. It was introduced before the formation of the province and its development has been quite similar to that in other provinces. Instruction has ranged from the ultra book method whereby the child was deluged with masses of information concerning matters outside his plane of observation to the extreme practical type in which an attempt was made to develop trained agriculturalists. Between these extremes were many variations but it is feared that the most common result was an absolute dearth of real agricultural instruction.

Under the impetus given the work through the Dominion grant for agricultural instruction certain definite results have been accomplished in Saskatchewan. In 1915 Directors of school agriculture were appointed and since then the various phases of agricultural instruction have been kept constantly before the public. By means of short courses, summer schools, special lectures at normal schools, teachers' conventions and institutes and the issue of bulletins

a better understanding of the subject has been brought about. While no change has taken place recently it may be of interest to give a brief outline of the policy of the Department of Education in this important phase of school work.

Education in terms of environment is a guiding principle in the modern school. As agriculture is our dominant industry and ideas and influences pertaining thereto greatly influence our thinking, the environment of the average child in Saskatchewan is agricultural. The whole of our school work should therefore be closely related to the life of the people. The course of study has been developed with this in view and our teachers are instructed to keep this ideal always before them.

Education in terms of an environment which happens to be agricultural does not necessarily mean education in agriculture. Agriculture as a subject of study implies physics, chemistry, biology and many of the sciences. The child, especially in the lower grades of the public school, has not reached the age to appreciate scientific study. He is in the nature study period when special attention should be given to expression of knowledge gained through direct observation with little regard for ordered detail or underlying principles. His environment provides abundant material—animals, plants, things living and dead, a world of interesting objects and abounding life. Making use of all these experiences the pupil is trained

to observe closely, think clearly and express himself definitely, while incidentally acquiring at first hand, a vast range of information about the life surrounding him. This is education through agriculture rather than education in agriculture.

In our course of study, therefore, nature study is carried on from grades I to VI inclusive, while in grades VII and VIII the course is designated agriculture. The type of work required in the upper grades is best shown by quoting from the course of study the introduction to the outline for those grades:

"Agriculture in the public school should be taught by the nature study method. The use of books as texts for the pupils should be avoided. Through the nature study of grades I-VI, a fund of information has been accumulated. This material should now be organized and correlated, and general principles discovered. In this work the school garden should become the laboratory where these general principles can be made plain and much experimental work carried out."

In this course plant life, crop production, the soil, farm animals and poultry, farm implements and farm management are studied, while weeds are given special attention.

In carrying on this work, the school garden is considered to be a most important agency. It is the laboratory for the study of cultivated plants, weeds, the soil and soil management as well as for the experimental work of the more formal agriculture. Unfortunately, the climatic and other adverse conditions are such that it is more difficult to carry on gardening operations in Saskatchewan than in any other

province in Canada. For this reason the garden in the school grounds has not been made compulsory, gardens at home organized in relation to the school work being recognized as meeting the needs of the situation.

The minimum academic requirement for teachers in Saskatchewan is now the second class diploma, given on satisfactory completion of a three years' course in high school work. During the first and second years, elementary science, a required subject, is developed from the agriculture standpoint and contains much material usually found in agriculture courses. In the third year agriculture is a subject of study on a par with physics and chemistry.

In addition to these regular courses a type of short course in agriculture for farm boys is being developed successfully. Last year the first course at Moosomin proved its value and arrangements are being made this year for carrying on this kind of work at a number of points in the province.

In conclusion, the policy of the Department of Education may be stated briefly to be—for the elementary school, education *through* agriculture rather than in agriculture; for the high school, a very definite and practical curriculum in agriculture is now in course of preparation to be ready for the opening of the high schools in the fall of 1920, designed to meet the needs of the boys and girls who intend to remain on the farm and to give an agricultural and home economics content to the holders of teachers' certificates.

THE RURAL EDUCATION ASSOCIATION

BY FRED W. BATES, B.A., M.S.C., DIRECTOR OF RURAL EDUCATION ASSOCIATIONS

THE need for a better understanding of the school and its work had given rise within recent years to a number of different organizations, such as: Parent-Teacher Associations; Home and School Associations; Mother Clubs, etc.,

each of which has made some contribution toward the solution of this difficult problem. As a result of these activities it can be stated confidently that to-day a greater number of people have an appreciative and intelligent understanding of the school

than at any previous time. Much, however, remains to be done before a satisfactory condition in this regard is brought about.

Another group of activities and organizations has developed through the growth of interest in community affairs and needs. Out of this movement has emerged the fact that the school is the only real community institution within reach of all and gradually a new view of the school is being developed. The statement that "the public school as simply an education centre for the child does not and cannot produce good citizenship," is rapidly receiving wider and wider acceptance. The dominant feature of the widespread community centre movement is the better use of the school as a centre of the whole life of the community.

In Saskatchewan similar movements have been developing for a number of years. As pointed out in the article entitled the School Exhibitions of Saskatchewan which appeared in the August, 1919, number of the AGRICULTURAL GAZETTE, the School Exhibition movement which had its inception in 1909 and the chief object of which is a true expression of the school has made marked and rapid progress during the past five years. During the same period increased interest has been shown in every activity related to the improvement of community life, not only by individuals but also by groups and organizations, with the inevitable overlapping and waste effort that always characterizes new movements. Practically every phase of this activity has in some way touched the school.

ORIGIN OF THE R.E.A.

Early in the movement the need for united effort in the solution of community problems became apparent. Existing organizations had failed because they represented groups in the community rather than the community. The only solution seemed to be in further organization

of the already over-organized communities. Out of the attempt to solve the difficulty, the Rural Education Association was born, the first one being formed early in 1916. Up to the end of 1919 a total of 133 have organized of which 114 are now in active operation; 7 having disbanded to enter new groupings while 12 ceased to exist. The organization has, therefore, been in existence sufficiently long for definite conclusions regarding its place and value to be reached.

The Rural Education Association is the Saskatchewan form of the community centre movement. Although it developed solely in the endeavour to meet local needs, the constitution shows striking similarity to that of the community clubs of other places. It is not a new organization fighting for a place in the community but an association of all organized bodies or groups operating in the area involved. It, therefore, stands for the community and is able to express community ideals and aspirations.

RELATION TO THE SCHOOL.

There is one feature of the organization which deserves special attention, its direct relation to the school. As noted above, we have come to realize that the school is the only true community institution of widespread existence. The Rural Education Association has from its inception recognized the essential place of the school by basing its organization on the school unit and having as its dominant ideal, better education. This overcomes a recognized weakness in the community club as usually organized which lacks a permanent rallying point and place of anchorage.

Since the dominant ideal of the Association is better education, projects related to the school are usually the first to be undertaken. The large majority organize school exhibitions, many develop and promote boy's and girls' clubs, while not a few conduct school picnics. In many instances the school activities are

arranged in two or three main sections, e.g., the school picnic, the school exhibition and the annual meeting of the Association at which the school prizes are awarded and contests in singing, public speaking and spelling held.

CHARACTER OF PROJECTS.

Each year, however, has seen more work attempted of a general community character. The association at Maidstone is organizing its work for 1920 in four main sections—school exhibition—under the guidance of a committee of teachers; sports—with persons interested in charge; boys' and girls' club—activities for boys and girls at home under the direction of experts in each department; and social—wherein an attempt is being made to conduct all forms of work looking to the improvement of the social life of the community. At Glidden, one of the newest villages in the province, a hall has been secured and is kept open for public

use three nights per week. Two evenings are devoted to games and general good fellowship but once a week a special programme is provided. The Association has raised funds to secure a lantern and will use the slides loaned by the Department of Education for such work. In addition a series of school concerts is being arranged among the surrounding districts.

Many other instances might be cited but the above are sufficient to indicate the character of the work being undertaken by the associations. The prospects for future development are very bright. Community spirit is growing and the desire for community expression increasing. The people in general are coming more and more to see the need for co-operation and united effort. In providing an organization which represents the life and ideals of the community, the association is meeting a deeply felt need and making a distinct contribution toward better citizenship.

TREE PLANTING ON SCHOOL GROUNDS

BY W. A. MACLEOD, EDITOR OF PUBLICATIONS

TREE planting on the school grounds in the province, as one of the first steps in permanent school ground improvements has been taken up by 242 schools since the organization of the work in 1915. Labour shortage and dry weather hindered the work in many districts which had planned to make preparations for tree planting.

It is desired by the Department of Education that trustees and teachers pay increased attention to the teaching of the subject of Nature Study and Agriculture in order that it may attain its proper place as one of the most important studies of the curriculum. To obtain satisfactory results from the teaching of this subject a school garden is an absolute necessity. This garden should be

properly protected by a suitable fence and shelter belt.

To assist trustees and teachers in obtaining trees and shrubs the director of school agriculture made arrangements with the Chief of the Tree Planting Division, Forest Nursery Station, Indian Head, and the Landscape Architect, Provincial Nurseries, Regina, for the free distribution of trees and ornamental shrubs to school districts.

In all cases where trees and seedlings were provided the trustees had undertaken to take care of the trees planted, but in many cases failed to make due allowances for the labour shortage and the dry weather, consequently the desired results were not attained. It is hoped that in future school boards will devise schemes whereby allowances will be made for the unforeseen.

APPLY ONE YEAR AHEAD

All applications for trees and shrubs must be made to the director of school agriculture before the first day of May in the year previous to the one in which it is wished to do the planting. Applications for planting in the spring of 1921 must be made before May 1920, and so on. Trees and shrubs will be supplied only to those schools where the ground has been properly broken and cultivated to kill grasses and native shrubs and in the year previous to the tree planting, thoroughly summer-fallowed.

The secretary of the school district making application will be required to forward to the director of school agriculture before November 1 of the year preceding planting, a complete statement of work done on the land; an agreement to properly care for trees and shrubs after planting; a complete plan of school grounds showing the exact location of all buildings, shelter belts, plots and playgrounds, as well as location of proposed planting.

When the directors by inspection of the grounds or otherwise have ascertained that the same have been properly prepared and that the trees will be well placed and cared for a number of trees or shrubs, as the case may be, will be allotted and shipped to the applicant.

A specific quantity of planting material cannot be guaranteed, as the amount available for distribution is limited. In the case of trees for shelter belts an endeavour will be made to maintain a minimum of 800 trees.

The material will be sent "express collect" to the applicant at his nearest express office having a resident agent and the applicant must make his own arrangements for further delivery.

Where school grounds are already protected by bluffs or natural timber or in cases where a good supply of natural timber is in the immediate neighbourhood where seed and seedling trees of native varieties can be obtained with little difficulty, ornamental shrubs and perennials only will be supplied.

ALBERTA

SCHOOL POULTRY CLUBS

BY J. H. HARE, B.S.A., POULTRY COMMISSIONER

DURING the past year each of the district agricultural agents in co-operation with the poultry branch of the Department of Agriculture undertook the organization of a number of school poultry clubs. The work was entirely new to parents, pupils and teachers but it was met with the most enthusiastic support from all.

Under the school club plan each member is supplied with 52 eggs of pure bred stock for hatching. These eggs are furnished free at the time of hatching with the understanding that they be paid for by supplying the Department with 52 eggs suitable for hatching purposes from pullets secured from the eggs furnished.

The chief difficulty thus far has

been to secure a sufficient quantity of eggs from bred-to-lay pure bred stock. This however will be overcome as the work progresses. The older members in future will be able to supply the newer members, at least with a portion of the eggs or stock required.

The district agents as far as possible give personal instruction and direction in the hatching, rearing and management of the young chicks and this is followed later in the season with instruction designed to teach the student how to manage the flock in the winter months.

The popularity and success of the poultry clubs has been such that an extension of the work is being planned for the ensuing year.

THE FIVE ACRE SCHOOL PLOTS

BY J. E. HODGSON, SUPERVISOR OF CONSOLIDATED SCHOOLS

THE regulations governing school consolidation in Alberta require that each consolidated school shall have five acres of ground attached. Since consolidation is yet in its early stages in this province these plots have not yet been put to much use, but with the progress and development of these schools this ground will be fully needed. In the mean time attention has been given to the promotion of such activities as are necessary to put into practice a proper grade school system requiring an experienced staff of teachers, and public and high school courses of study. We are now giving

attention to promoting such activities as school and home gardening, school fair work, elementary domestic science, manual training, and community centre work. When these activities have been fully developed the five acre plot attached to each school will not be in excess of their requirements. In many cases the ground is being put in order by clearing and fencing, tree planting will then begin which will be followed by school gardening, the cultivation of flowers and the work in connection with experimental plots for agriculture.

BRITISH COLUMBIA

NIGHT SCHOOLS IN AGRICULTURE

BY H. E. HALLWRIGHT, B.S.A., DISTRICT SUPERVISOR OF AGRICULTURAL INSTRUCTION

OUR night classes in agriculture have been conducted in Victoria and Saanich during the winter months since the winter of 1917-18. It has been the aim of the Director of Elementary Agricultural Education for British Columbia to co-operate, through his men, with the departments of agriculture whenever time permitted so during the winter, when the school gardening is at a standstill, we were requested to do what we could to meet the needs of those who required supplementary theory, or laboratory practice, for their farm work.

In 1917-18 therefore, classes were organized at Keating, in the municipality of Saanich, and at the Victoria, High School. I found that the requirements of the students at each centre were entirely different, as those in attendance at the high school were almost exclusively residents of urban or suburban districts and either unfamiliar with agricultural practice or only acquainted with it through former contact.

At Keating the program followed

was of a more or less theoretical character, grounding the students in principles and leaving them to apply them in their daily work. I encouraged the question and answer method of instruction as far as possible, partly in order to drive the information home by means of practical examples and partly because I was new to the district and I had a lot to learn about local conditions. I found this to be a fruitful source of information. There were some ten or more young men and as many young women in attendance at first. The attendance began to fall off a little after the severe winter weather set in and also on account of the fact that several of the young men left to go overseas, but about half a dozen in all remained with the class throughout the whole course, from November 1st, 1917, to February 28th, 1918.

HIGH SCHOOL CLASS.

The high school class was more difficult to organize. I cannot say that I ever came to a completely

empty room, but on one particularly bad night there was but a single student available for instruction. Before the season was over I had about fifteen, however, which was gratifying.

My method throughout was based on the democratic principle of "The greatest good to the greatest number". While I always had a tentative course to offer, any special work that was needed by the majority received premier consideration. Here we always tried to make the greatest possible use of our available equipment through direct instruction. This year I have made a preliminary introduction of principles which we are going to follow up by individual work in the laboratory. Occasionally illustrated lectures were included, especially in the work on livestock and landscape gardening. The periods, as a rule, averaged an hour and a half.

The winter of 1918-19 was upset by the influenza epidemic. I was unable to organize a rural class at all and the high school work was interrupted twice before the end of the old year. The class averaged about ten students, some of whom had attended the previous winter. Although few in number they were a loyal crew and several made 100 per cent attendance.

This year I have concentrated my efforts on the high school class; owing to the paucity of young men in the rural districts, the high wages offered by the city industries having attracted the majority of

them citywards. Next year I hope to see a reflex movement and some incentive to organize in the country.

PRESENT METHOD

My method is the same as hitherto. As far as I have been able to meet the wishes of the majority of those whose attendance is regular I have done so. A total of thirty-seven students have been enrolled up to date. Of these, thirty-four have made fairly regular attendance. Five have made 100 per cent attendance, since joining and on no occasion has there been less than a 50 per cent attendance, although the weather has been very severe recently. We began work on Monday, Nov. 3rd, and have been holding the class every Monday and Wednesday evening. Our work during November was mainly that of soil study and largely theoretical. We shall devote some time to laboratory work before the close of the season by way of review. My reason for dispensing with the direct method was partly on account of lack of accommodation. Before the practical work commences, too, those who mean business will have established themselves as regular attendants and the class will be less unwieldy. I believe soundly in direct instruction for the average student whether adult or immature.

The class is open to either men or women and about 20 per cent of the students consist of the latter. I find the ladies very ready to adapt themselves to the work and as loyal as the best.

SCHOOL FAIRS IN 1919

BY J. W. GIBSON, DIRECTOR OF ELEMENTARY AGRICULTURAL EDUCATION

IN British Columbia school fairs are usually held in conjunction with the regular agricultural or fall fairs. In some cases where no agricultural fair is held the schools put on their own fair. So far we have been able to make satisfactory arrangements with the agricultural societies in the matter of space for

exhibits, prizes, etc. In fact, most of our school fairs represent the co-operation of three agencies—agricultural societies, school boards, and the Department of Education,—all three making contributions towards the prize list. The Department of Education allows a grant of five dollars for each school putting in an

exhibit with a maximum total of twenty-five dollars for any one fair. Our best school fairs are those organized in the districts served by district supervisors of agricultural instruction.

The Chilliwack school fair has for several years been one of the most successful held in the province. A brief statement of some of the main features may be of interest. The fair was held on September 23 to 25, in connection with the regular agricultural fair. Fourteen schools were represented and every class was keenly contested. "Every pupil a Competitor", was the slogan adopted. In addition to numerous exhibits representing the usual classroom work, such as writing, drawing, and handwork, there were competitions in nature study collections such as insects, wild flowers, and native fruits. Manual training exhibits included collections of commercial woods and also woods damaged by insects, models of farm buildings, bird houses, articles for use in kitchen and dining room, together with working drawings. Domestic science exhibits included various kinds of cooking and canning, sewing and needlework.

The school garden exhibits formed the most spectacular part of the show inside the main building. Each of the fourteen schools was allowed a certain space and the awards were based upon variety, quality, and arrangement. Special nature study entries included collections of wild flowers, life history of the oat plant, life history of the cabbage butterfly, and collections of nature photographs. Special agricultural exhibits included pigs, dairy calves, poultry, largest pumpkin, collection of garden vegetables and plan of dairy barn.

The prize list called for 77 classes representing altogether 876 entries, with a total prize value of nearly seven hundred dollars. The prize list and all details of management were handled by a committee of the Chilliwack Teachers' Association.

On the evening of the closing day a grand concert was given in the opera house by the teachers and pupils of the city and municipality schools. A character parade was also arranged for children's day and proved to be a very attractive feature. The agricultural society has found that by co-operating with the teachers of the city and surrounding district a very much better exhibition can be put on and they have always accorded generous treatment to the schools in this connection.

At the Surrey school fair soil products—vegetables, grain and fruit—were most in evidence. Each school was allotted a space eight feet square in which to display the products of their respective school gardens. A special shield was awarded to the school taking first place in the contest.

SPECIAL CONTESTS

A special mangel growing contest was conducted in connection with home gardening projects during the season by the district supervisor of agricultural instruction for the municipality. The special aim of this contest was the encouraging of root seed production. Each exhibitor showed a quantity of mangel seed, the product of five mangels, and also five roots selected and properly trimmed for the next year's seed production. This branch of home project work has been greatly encouraged by Professor P. A. Boving, Agronomist of the University of British Columbia, who furnished the stock seed for the contest and who also donated a silver cup to be held by the winner of the contest. Professor Boving also supplied seed potatoes (Netted Jan) for a contest in Surrey municipality. As a result an excellent show of potatoes was afterwards placed in school exhibits from Surrey at the provincial fair at New Westminster. This sample, which was declared by the judges to be the best in the hall, was pur-

chased by the University for a special selection experiment.

Other contests at the Surrey school fair included corn growing—Quebec No. 28 being used—aster growing for girls, and collections of weeds and native woods. Several contests in manual training and domestic science were featured and also judging contests.

The only contest in live stock was that in dairy calves and pigs held in connection with the Canadian Bankers' Association fall fair contest. Both classes were well represented. A challenge cup was given to the school winning the largest number of prizes at the school fair.

The school fair for Langley municipality was held at Milner, the organization being similar to that just described for Surrey. More than a dozen school fairs were held at various points in the province and it is expected that next year will see considerable advance along this line.

For the first time since 1913 the provincial fair at New Westminster

was held during the first week of October, 1919. The educational committee of the fair arranged for school competitions in several branches of school work. The exhibits of school garden produce were very creditable as were also those in manual training and domestic science. The municipality of Chilliwack carried off first prize on the school garden exhibit, Surrey coming second with Langley a close third. The Herbert Spencer School of New Westminster took first place in the competition amongst city school gardens with the Oaklands School of Victoria second.

The success attending this feature of the provincial fair under numerous difficulties this year certainly warrants a decided extension of these school contests another year and steps are being taken to so organize the school competitions for 1920 that they will doubtless prove one of the finest attractions as well as one of the best educational features of the big provincial fair.

NATURE STUDY IN RELATION TO AGRICULTURE

BY JESSIE J. ROBINSON

IN discussing the relation of nature study to agriculture, one of the first questions to be asked is "What is Nature Study?" This is indeed a difficult question to answer, for it is not merely a study of nature as the name would imply. It is not a science; it is not knowledge; it is not facts; but it is spirit and that spirit is concerned with the child's outlook of the world with which he is daily associated. Nature study will thus endure because it is natural and of universal application.

Fundamentally, nature study is seeing what we look at and drawing proper conclusions from what we see; and thereby we come into personal relation and sympathy with the object.

Again, it is studying things and the reason of things. It is not only

the teaching of botany, entomology, or geology, but of those subjects which have to deal with our whole environment.

The nature study idea is necessary for the evolution of popular education. It must, then, be applied to all branches of education, and thus we see how it leads up to agriculture. The accustomed methods of education are less applicable to farmers than to any other people, and yet the farmers form the greatest part of our population.

TRAINING FOR RURAL CONDITIONS.

Until very recently the children have been taught more of the city than of the country in which the majority of them live. Thus a desire to go to the city or town has been early instilled into the child-

mind. This is what we of to-day are endeavouring to overcome. The Dominion of Canada is essentially an agricultural country. The greater part of its wealth lies in the cultivation of its soil, and we should seek to teach the child concerning those conditions which daily surround him. The mental development of the child naturally follows the satisfaction of his desire to know the whys and wherefores of facts, especially when the knowledge of these facts comes through his own observations. The teaching of nature study will broaden his horizon. It will teach him to see and appreciate those things which have been previously escaping his notice.

VALUE OF THE SCHOOL GARDEN.

The school garden is an excellent place for the child to study nature, but even this should not be perfect or we may defeat our purpose. It should show some mistakes, if merely for the purpose of teaching the child the correction of these errors. As one man has said "The proper use of the school garden is not to produce big cabbage-heads, but well-developed children's heads."

To create a larger public sentiment in favour of agriculture and to increase the boy's respect for such work are the controlling purposes that we carry forward under the title of nature study.

Agriculture is more than mere farming. In its true sense it is advanced nature study, and we get an example of this from our experimental farms throughout Canada. They are conducted purely on the basis of observation and experimentation, for the purpose of obtaining the best methods of tilling the soil and the eradication of all injurious diseases.

Farming in this manner can never become monotonous, for there will not be a repetition of the same thing day after day, as is undoubtedly the case in many other professions.

KNOWLEDGE IS POWER AND PLEASURE.

The chief aim, then, of nature study is to teach the farmer boys and girls to appreciate and love the country. If the farmer as he walks through his corn rows, sees only clods and weeds and corn, he leads an empty and barren life. But if he knows of the work of the moisture in the air and soil; of the use of air to the root and leaf and of energy obtained from the sun along with the other forces of nature, he realizes that he is no mere toiler. In the words of President Felmley "He is marshalling the hosts of the universe and upon the skill of his generalship depends the life of nations."

A knowledge of nature study is, moreover, of great economic value to the farmer. For instance, his fruit trees may be deteriorating rapidly, his grains and vegetables may become affected with various diseases and he does not know the cause or the proper treatment for the overcoming of this blight. By a nature study course all these things may be brought under our observation and the proper methods of treatment discussed. In this way a farmer may be able to completely eradicate all diseases from his farm without any assistance from outside agencies as is so often necessary.

A more highly developed system of nature study is what we are now endeavouring to obtain so that in the boys of to-day we may see the farmers of to-morrow leading happy and more efficient lives because they understand what they are doing.

City children will form habits of industry and regularity by utilizing their energies on the backyards and vacant lots that are now largely unproductive.

PART IV

Special Contributions, Report of Agricultural Organizations, Publications, and Notes

ASSOCIATIONS AND SOCIETIES

EVENTS OF THE MONTH

- February 2, Ontario Ploughmen's association meeting at Foresters' Hall, 22 College St., Toronto; secretary, J. Lockie Wilson, Department of Agriculture, Toronto.
- 2, Canadian Thoroughbred Horse Society, Directors' Meeting.
- 2, Canadian Swine Breeders' Association, Directors' Meeting.
- 2, Canadian Thoroughbred Horse Society, Annual Meeting.
- 2, Ontario Berkshire Club, Annual Meeting.
- 2, Ontario Yorkshire Club, Annual Meeting.
- 2, Canadian Pony Society, Directors' Meeting.
- 2, Canadian Jersey Cattle Club, Directors' Meeting.
- 2, Dominion Shorthorn Breeders' Association, Directors' Meeting.
- 2, Canadian Swine Breeders' Association, Annual Meeting.
- 2, Canadian Pony Society, Annual Meeting. Held in the Carls Rite Hotel, Toronto.
- 3, Annual meeting of the Canadian National Trotting and Pacing Harness Horse Society will be held at the Carls Rite Hotel, Toronto; secretary, W. A. McCullough, 990 Queen St., West, Toronto.
- 3, Ontario Swine Breeders' Association, Directors' Meeting.
- 3, Canadian Trotting Association, Directors' Meeting.
- 3, Ontario Swine Breeders' Association, Annual Meeting.
- 3, Dominion Shorthorn Breeders' Association, Annual Meeting, Temple Building.
- 3, Canadian Jersey Cattle Club, Annual Meeting.
- 3, Canadian Standard-bred Horse Society, Directors' Meeting.
- 3, Canadian Trotting Association, Annual Meeting.
- 3, Canadian Sheep Breeders' Association, Directors' Meeting.
- 3, Canadian Sheep Breeders' Association, Annual Meeting.
- 3, Canadian Standard-bred Horse Society Annual Meeting. Held in the Carls Rite Hotel, Toronto.
- 3-4, Ontario Association Fairs and Exhibition Convention, Foresters' Hall Toronto; secretary, J. Lockie Wilson, Department of Agriculture, Toronto.
- 3-4, Quebec Breeders' meeting, Quebec City; secretary, J. A. Couture, 49 Garden St., Quebec.
- 4, Annual meeting of the Brown Swiss Association at New Sherbrooke House, Sherbrooke, Que.; secretary-treasurer, Ralph H. Libby, Stanstead, Que.
- 4, Ontario Sheep Breeders' Association, Directors' Meeting.
- 4, Ontario Sheep Breeders' Association, Annual Meeting.
- 4, Canadian Ayrshire Breeders' Association, Directors' Meeting.
- 4, Canadian Kennel Club, Directors' Meeting.
- 4, Clydesdale Horse Association of Canada, Directors' Meeting.
- 4, Canadian Hackney Horse Society, Directors' Meeting.
- 4, Canadian Aberdeen-Angus Association, Directors' Meeting.
- 4, Ayrshire Banquet.
- 4, Canadian Aberdeen-Angus Association, Annual Meeting.
- 4, Canadian Hackney Horse Society, Annual Meeting.
- 4, Canadian Kennel Club, Annual Meeting.
- 4, Ontario Horse Breeders' Association, Directors' Meeting.
- 4, Ontario Horse Breeders' Association, Annual Meeting. Held in the Carls Rite Hotel, Toronto.
- 5, Thirty-third annual meeting of the Holstein Friesian Association of Canada to be held at the Prince George Hotel, Toronto; secretary, W. A. Clemens, St. George, Ont.
- 5, First annual meeting of Ontario Ranchers will be held at the Carls Rite Hotel, Toronto, Ont.; ranch specialist, C. M. Laidlaw, Department of Agriculture, Burwash, Ont.

- 5, Ontario Cattle Breeders' Association, Directors' Meeting.
- 5, Ontario Cattle Breeders' Association, Annual Meeting.
- 5, Canadian Shire Horse Association, Directors' Meeting.
- 5, Canadian Shire Horse Association, Annual Meeting.
- 5, Canadian Ayrshire Breeders' Association, Annual Meeting.
- 5, Clydesdale Horse Association of Canada, Annual Meeting.
- 5, Canadian Hereford Breeders' Association' Directors' Meeting.
- 5, Canadian Hereford Breeders' Association, Annual Meeting.
- 5, Holstein-Friesian Association, Annual Meeting.
Held in the Carls Rite Hotel, Toronto.
- 5-6, Ontario Horticultural Convention, Foresters' Hall, Toronto; secretary, J. Lockie Wilson, Department of Agriculture, Toronto.
- 5-6-7, Poultry Show at Quebec city; secretary, E. Desrochers, 47 Buade St., Quebec.
- 6, Annual meeting of the Eastern Canada Live Stock Union, Carls Rite Hotel, Toronto; secretary, R. W. Wade, Department of Agriculture, Toronto.
- 6, Eastern Canada Live Stock Union, Annual Meeting.
Held in the Carls Rite Hotel, Toronto.
- 10-12, Poultry Show of the Prince Albert Poultry Association; secretary, D. Malcolmson, 435 East, 11th Street, Prince Albert, Sask.
- 10-13, Saskatchewan Grain Growers annual meeting, Saskatoon; secretary, J. B. Musselman, Regina.—
- 11-14, Poultry Show, at Neepawa, Man.; secretary, C. W. Parrott, Box 92, Neepawa, Man.
- 11-13, Saskatchewan Dairy Association annual meeting at Moosejaw; secretary, Percy Reed; Department of Agriculture, Regina, Sask.
- 13, Annual meeting of the Canadian Belgian Draft Horse Association will be held at the Department of Agriculture, Quebec, P.Q.; secretary treasurer, J. Arthur Paquet, Quebec, P.Q.
- 16-21, "All Canada" creameries and butter-makers competition in connection with the Western Canada Dairy Show and the Manitoba Dairy Association convention, Winnipeg; secretary, L. A. Gibson, Parliament Buildings, Winnipeg.
- 16-22, Western Canada Dairy Show, Winnipeg; secretary, L. A. Gibson, Winnipeg.
- 17, The annual general meeting of the National Dairy Council of Canada will be held at Fort Garry Hotel, Winnipeg; secretary, D'Arcy Scott, Ottawa, Can.
- 23-28, Soil Production and Child Welfare Convention, Winnipeg, Man.; secretary,
- 24-25, Alberta Dairy Convention, Edmonton, Alta.; secretary, E. T. Love, Edmonton, Alta.

AIMS AND OBJECTS OF THE WOMEN'S INSTITUTES OF BRITISH COLUMBIA

BY MRS. V. S. MACLACHLAN, SECRETARY

It is our duty and privilege as institute members to improve conditions of rural life, which is the best life in the world, so that settlement may be permanent and prosperous in the farming communities. We do this by the study of home economics which, in addition to preparing three wholesome meals a day, means to keep our thoughts and ideas in right proportion, and to know that bodily weariness is not economical; and secondly by the study of child welfare and prevention of disease to improve the conditions of rural life. These two go hand in hand. Child welfare is the foundation stone upon which the health and well-being of the nation of to-morrow is builded. In the light of to-day's knowledge there should not be any one child in our province suffering from malnutrition or one removable physical defect. The prevention of disease would mean largely the problems of rural sanitation. The solution of this question in this province will depend very largely upon the amount of intelligent support rendered by our women's institutes.

LOCAL NEIGHBOURHOOD NEEDS

Unsanitary conditions can be improved only when the people of the community are sufficiently educated to the dangers coming from unhealthy sources. There is a movement in some rural organizations to form reading circles for the purpose of self education along public health lines and some of our institutes are seriously considering forming such circles. Splendid work has already been done including the improvement of the rural school, inside and out, and the improvement of the parks and grounds around public buildings. There have been clean-up days, the planting of trees and shrubs on school and other public grounds. Some institutes have found great need of improvement in cemeteries and several have made this a special work during the year. Institutes whose field of endeavour is in the electric railway belt have improved conditions in the waiting rooms. All these improvements are making the community a better place in which to live.

THE INDUSTRIAL AND SOCIAL CONDITIONS

It has been the history of farm life of the past that the long hours that country children spend at work on the farm are such as to impair the health, and engender such revolt against farm life as in a large measure to account for the exodus from the farm to the city. Our institutes are doing well in taking up this phase and presenting the matter before the provincial legislature.

LAWS AFFECTING WOMEN AND THEIR WORK

The minimum wage law, requests for mothers' pensions, and maternity benefits have always had strong support from our institutes as a whole. These are all working towards the same good end in the farming communities. This matter is being given a good deal of attention and institutes are requesting that adequate nursing service be placed within the financial reach of every resident in the rural districts.

SOCIAL AND EDUCATIONAL CENTRE

The great need all over the rural districts is for a better type of social life, and "social centres" is the great cry if we are to keep our boys and girls in the most desirable place under the sun and make settlements in the rural communities permanent and prosperous.

No organization is better fitted to do this work than the institute. Here is an opportunity for education, working with the Health and Education Departments and it is an opportunity to make our soldiers and their wives an integral part of our social structure.

LOCAL INDUSTRIES FOR WOMEN

Agricultural work has been assisted in every possible way by the Department, lecturers have been sent out speaking on different subjects, bulletins have been published, and competitions in such branches as poultry, live stock, and fruit growing have been established. Local jam industries and fruit drying plants have not received the attention which they deserve but there is every prospect that many such plants will be established throughout the fruit growing districts where the industry is a live organization. Cloth and basket weaving, glove and toy making are industries, which, it is confidently believed, will be established in many districts.

There seems to be no social problem which the machinery of our women's institutes, rightly controlled and directed, cannot solve. It is our ambition to build a more virile race and perpetuate even loftier ideals than those that have actuated the present generation.

INTERNATIONAL POULTRY ASSOCIATION

The report of the sub-committee of the International Association of Poultry Instructors and Investigators on the sale of eggs at the London meetings of September 23 and 25, 1919, contains the following resolutions which were adopted by the sub-committee at its final session and ordered to be issued to all ministries of agriculture interested in the egg trade.

1. "That the sub-committee on sale of eggs commends to all ministries of agriculture the importance of securing, as far as possible, control in the exportation of eggs, where not already in operation as a guarantee of such standards of quality and size as may be adopted in their respective countries;

"That at further meetings of this sub-committee communications received from the various countries be considered with a view to the adoption of uniform standards for international trade in eggs to be recommended; and

"That the sub-committee recognized that each country will retain its liberty to adopt standards for its own eggs for home consumption."

111. "That the sub-committee on sale of eggs suggests to the various ministries of agriculture that any regulations which may be suggested for adoption in their respective countries for standard of quality and size of eggs, shall be submitted for consideration at the First World's Poultry Congress, to be held at The Hague in 1921, with a view to securing uniformity in their application."

IV. "That the various ministries of agriculture be requested to provide for the sub-committee on sale of eggs, in the first place, facts as to variations in price and information upon the following points:—

"(a) What are the control markets for eggs, which affect shipments from each country?

"(b) Whether producers and shippers are satisfied with the trend of markets to which supplies are forwarded?

"(c) How did fluctuations of prices in pre-war days affect the prices to producers in supplying countries, and whether such prices were not lower than would have been the case had eggs been only subject to seasonal rise and fall in values?"

NATIONAL POULTRY COUNCIL FOR GREAT BRITAIN

The following resolution was adopted at the meeting of the National Poultry parliament held at Birmingham, England, November, 22nd, 1919,—that it is hereby resolved there shall forthwith be formed a National Poultry Council properly elected by poultry societies, clubs, institutions,

engaged in poultry teaching and research, and societies and distributors engaged in the sale of eggs and poultry who may become affiliated with that council, and representatives of all branches and sections of the poultry industry.

DOMINION BANTAM ASSOCIATION

At the third annual business meeting of the Dominion Bantam Association held at Guelph the matter of a combined meet of the Dominion Bantam Association and the American Bantam Association was taken up and placed in the hands of a committee.

The officers elected for the coming year, were, President, W. W. Simpson, Guelph; vice presidents, W. Carter, Toronto, and W. F. Brereton, Toronto, secretary-treasurer, J. T. Isbel, 39 Woolfrey Ave., Toronto.

MARITIME POULTRY ASSOCIATION

At the annual meeting of the Maritime Poultry Association held on December 17th, 1919 at Amherst, N.S., an endeavour was made to secure improvements and the enlargement of the poultry exhibit at the winter fair. The association is also seeking larger representation on the winter fair board.

The officers for 1920 elected are,—President J. R. McMullen, Truro, N.S., Vice Presidents, N.S.—Charles Johnson, North Sydney; P.E.I.—A. F. Houston, Charlottetown; N.B.—

R. P. Allen, Fredericton; secretary-treasurer, A. C. McCulloch, Fredericton, N.B.

The annual meeting of the Maritime Poultry Association was held at Amherst on December 18th. The following officers were elected: President, J. R. McMullen, Truro; vice-president for Nova Scotia, Chester Johnson, North Sydney; vice-president for New Brunswick, R. P. Allen, Fredericton; vice-president for Prince Edward Island, Alf. Heuston, Charlottetown; secretary-treasurer A. C. McCullough, Fredericton.

QUEBEC POULTRY ASSOCIATION

Among the more important resolutions adopted at the convention of the Province of Quebec Poultry Association were the following:

1. That every effort be put forward by the Province of Quebec Poultry Association and the local associations in co-operation with the Department of Agriculture in developing the poultry industry to meet the enormous annual deficit in eggs and poultry meat.

2. That a provincial poultry show should be held annually during January in a centre chosen by this association. The classification for this show should be liberal and on a par with the provincial shows of other provinces. Special attention should be paid to utility classes, dressed poultry, and eggs.

3. That each local poultry association should hold a show annually and to the shows where no admission fee is charged the Department of Agriculture is urged to provide a grant of sixty-five per cent of the prizes paid. The poultry shows should be

arranged in circuits to avoid clashing of dates, to enable the securing of the best possible judges, to minimize expenses in regard to caging and to standardize the management of all shows with reference to prize-lists, entry-forms, tags and other matters.

4. That each local poultry association should render to the P.Q. Poultry Association annually a report of its activities for the year. The financial year of each association should end at about the same time in order that all reports may be in the hands of the secretary of the provincial association at the same time.

5. That the Province of Quebec Poultry Association should render to the Department of Agriculture an annual report covering the activities of the association for the year.

6. That the French and English editions of the Journal of Agriculture become the official organs of the association and that the matter be brought to the attention of the members of local associations.

ONTARIO POULTRY ASSOCIATION

Several matters of importance were dealt with at the annual meeting of the Ontario Poultry Association held at Guelph in December. A grant of \$100 was voted for

the Ontario Agricultural College memorial hall. The meeting was unanimously in favour of continuing the annual winter show at Guelph. A resolution from the Leghorn

Club of Canada asking that at next year's fair both light and dark Leghorns be put on the prize list was left in the hands of the directors.

The officers for the ensuing year elected

are: President, A. E. Field marshal, Beamsville; 1st vice-president, Prof. R. R. Graham, Guelph; 2nd vice-president, J. S. Greenshield, Toronto; secretary-treasurer, R. W. Wade, Parliament Buildings, Toronto.

ALBERTA PROVINCIAL POULTRY ASSOCIATION

At the annual meeting of the Alberta Provincial Poultry Association held at Calgary on November 27th, 1919, the following officers were elected for the ensuing year: President, C. N. Baker, Calgary; 1st vice-president, W. A. Moore, Medicine Hat; 2nd vice-president, James Westbrook, Leth-

bridge; secretary-treasurer, P. J. Timms, 1618 14th Ave. West, Calgary.

Owing to the dates of some of the poultry shows in the province clashing it was decided that the executive at their next meeting fix the dates of next winter's shows of the affiliated associations.

NATIONAL FEDERATION OF CO-OPERATIVE LIVE STOCK SHIPPERS

Twenty-one American states and four Canadian provinces were represented by over three hundred co-operative live stock shipping delegates at the convention held in Chicago on December 3 and 4, when a permanent National Federation of Co-operative Live Stock Shippers was outlined and final arrangements for its conduct were completed. The objects of this federation in a general way are; to encourage better and more economical methods in the production and distribution of live stock and live stock products; to promote co-operative education, and to encourage the organization of co-operative live stock marketing organizations; to develop uniformity in the plan of

organization and method of operation of local live stock shipping associations; to aid such organizations in problems of general interest in transportation, handling, and marketing; to lease, buy, build, own, improve, mortgage, sell, and control such buildings and other real and personal property as may be necessary in the conduct of its operations; and to perform any other work which may be of benefit to its members or helpful to the industry.

The national and state federations will be financed on a small membership fee and a per car charge basis which will be regulated from time to time to meet the needs of the shippers.

NATIONAL DAIRY COUNCIL OF CANADA

Under date of December 30, 1919, letters patent were issued by the Dominion Government incorporating five men under the Companies Act, R.S.C., 1906, Chapter 79, for the following purposes:—

(a) To consider and advance all matters tending towards the improvement of the Dairy Industry in Canada, including production, manufacture, transportation, storage and marketing;

(b) To consider proposed legislation and regulations both provincial and federal and to assist in obtaining such legislation and regulations as will be beneficial to the Dairy Industry;

(c) To promote interprovincial co-operation for the purpose of the importance of the industry and to obtain for it the position it deserves as the most technical and complicated branch of agriculture;

(d) To encourage the adoption throughout Canada to uniform standards for dairy products;

(e) To encourage the holding of meetings, and the distribution of literature and by

systematic advertising to inform the general public in regard to the food value of dairy products;

(f) To encourage production, uniform standards of grading and by co-operation in marketing, assist in developing a better trade for Canadian dairy products;

(g) To co-operate with the railways in securing the best conditions for transportation, and a just equalization of charges therefor;

(h) To carry on any business which may seem to the Council capable of being carried on in furtherance of the objects above set out.

The men incorporated are Edward H. Stonehouse, Weston, Ont.; Alexander A. McKay and James M. Carruthers, Winnipeg; John Bingham and D'Arcy Scott, Ottawa. The operations of this corporation will be carried on, without share capital, throughout the Dominion of Canada and elsewhere under the name of the National Dairy Council of Canada and the head office of the corporation will be in Ottawa, Canada.

CANADIAN CO-OPERATIVE WOOL GROWERS' ASSOCIATION

BY G. E. O'BRIEN, ASST. MANAGER

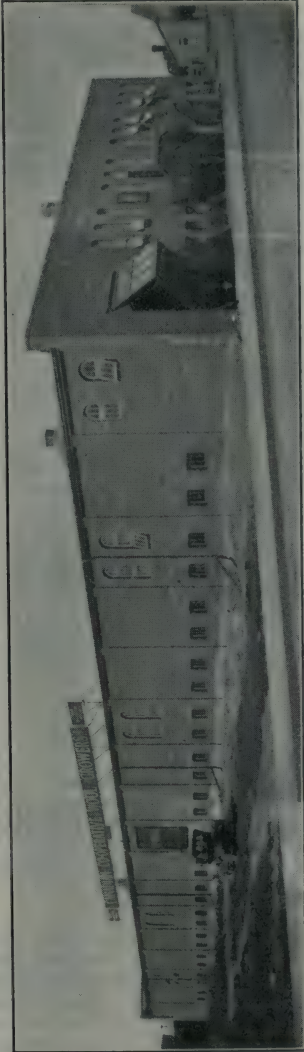
The Canadian Co-operative Wool Growers, Limited, with headquarters at 128 Simcoe Street, Toronto, handled approximately

Live Stock Branch of the Department of Agriculture, Ottawa. Most of the wool, more especially all the finer grades, has been sold. Considerable coarser wools are yet to be disposed of.

So far as the wool market itself is concerned, on this continent, it is peculiarly different from that of other years. Previous to the war the difference in the prices of the various grades would average about one cent a pound difference. During the war period the demand for wools tended very largely to the medium strong staple wools. This year, up to within the past few weeks, the entire demand has been for the very finest grades of wools, with the medium and coarser grades entirely neglected in the market. Also this year has been a variation in the prices of grades from 65 cents upon a clean basis for coarse wools to \$2 for fine staple. The fine wools began to advance in price very early last spring and have gradually been on the advance right up to the present time.

The whole trade generally and the growers as well, naturally believed that it would only be a matter of time before the medium wools began to advance and follow the fine in the upward tendency. However, quite the reverse was the case, and fine grades continued to advance, and medium and low became absolutely neglected with very limited sale of these grades in either the Canadian or United States market. Such sales as there were, were in many instances made through forced liquidation, and through the easing of prices. The Canadian Co-operative Wool Growers' under these conditions readily disposed of the fine grades and then, following a dull period, the fine medium or half blood. While right at the present time the demand for medium or three-eighths wools is good and sales of all the organizations holding in this grade will be readily completed, the demand is not yet active for the low medium or coarser grades. Trading in these, however, will likely soon be fairly active.

The following statement shows the quantities and grades of the wool received from associations in the different provinces.



WAREHOUSE AT WESTON, ONTARIO, WHERE CANADIAN WOOL SHIPPED TO THE CANADIAN CO-OPERATIVE WOOL GROWERS' LIMITED IS ACCUMULATED AND STORED UNTIL MARKETS ARE AVAILABLE

4,000,000 pounds of wool of the 1919 crop. This wool was received from the different provinces through local wool growers' association. The wool was all graded by the

CANADIAN CO-OPERATIVE WOOL SHIPMENTS

Grades	Eastern Canada			Western Canada			
	Mar. Pro.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
F. Staple.....				520	23,305	125,937	7,643
F. Clothing.....			270	7,120	22,640	143,190	6,772
F. Combing.....			387				
F. M. Sta.....				26,465	98,648	364,980	9,472
F. M. Clo.....		204	7,176	25,973	65,228	109,635	4,329
F. M. Cbg.....		164	7,126				
M. Sta.....				64,933	232,987	360,136	19,599
M. Clo.....		7,070	17,322	22,806	50,744	59,083	8,283
M. Cbg.....	107,620	78,271	207,964				
L. M. Sta.....			522	66,649	154,568	177,676	29,561
L. M. Clo.....				2,813	663	1,770	341
L. M. Cbg.....	95,119	70,447	258,780				
L. Sta.....			377	22,318	26,671	23,807	3,241
L. Clo.....				21		52	
L. Cbg.....	11,492	10,565	92,173				
Coarse.....	6,167	6,359	118,539	6,410	7,996	5,473	137
B. & S.....	154		13,570	7,253	19,655	11,998	1,210
Cotts.....	993		23,218	4,930	1,226	3,493	1,201
Rejects.....	1,435	8,394					
Dead.....	4		4,580	1,683	3,469	10,494	820
Black.....	164						
Murrain.....					349	940	
G. & B.....	2,823	1,398	3,841	4,968	3,806	8,074	407
Tags.....	2,297	2,237	18,662	9,427	14,992	19,526	2,721
Damaged.....	171			240		164	
Bucks.....						2,018	
Sweeps.....			2	280	170	1,340	
Mohair.....		151		115	218	1,358	7
Sisal.....				3,398	92	2,760	
Kempy.....				205	22	20	
Pulled.....						153	51
Tub Wash.....	1,424	99	4,011		91	49	164
Coarse Wash.....			2,727				
Horse Hair.....					33	23	
Ungraded.....			11,337		14,424	20,165	210
C. & B.....						6,271	
Low Kar.....						2,491	
Med. Kar.....						563	
Sheep Skins.....					5,900	3,396	600
Totals.....	229,863	185,359	792,701	288,527	749,947	1,466,973	96,769

CANADIAN SHEEP BREEDERS ASSOCIATION

In accordance with the usual custom carried out by the Canadian Sheep Breeders' Association the provincial directors outside of Ontario have been elected by mail as follows:—Alberta—R. Knights, Calgary, Alta.; British Columbia—The Hon. S. F. Tolmie, Victoria, B.C.; Manitoba—George Gordon, Oak Lake, Man.; Maritime Provinces—W. B. Bishop, St. John, N.B.;

Quebec—James Bryson, Brysonville, Que., Arsone Denis, St. Norbert Station, Que.; Victor Sylvestre, St. Hyacinthe, Que.; Saskatchewan—Fred T. Skinner, Indian Head, Sask.

The Ontario directors will be elected at the annual meeting of the association to be held in Toronto on February 3rd.

CANADIAN GUERNSEY BREEDERS' ASSOCIATION

The annual meeting of the Canadian Guernsey Breeders' Association was held at Amherst, N.S., on December 17th. The following officers were elected: President,

Capt. Hugh Devon, Central Onslow, N.S.; vice-president, Jas. T. Roper, Charlottetown, P.E.I.; secretary-treasurer, Howard Corning, Yarmouth, N.S.

CANADIAN SWINE BREEDERS' ASSOCIATION

The provincial directors of the Canadian Swine Breeders' Association outside of Ontario have been elected by mail vote as follows:—Alberta—C. H. Hutton, Lacombe, Alta.; British Columbia—Albert G. Marshall, South Westminster, B.C.; Manitoba—W. H. English, Harding, Man.; Maritime

Provinces—J. F. Roach, Sussex, N.B.; Quebec—Frank Byrne, Charlesbourg, Que.; M. Ste. Marie, Compton, Que.; Saskatchewan—Philip Leech, Baring, Sask.

The Ontario directors will be elected at the annual meeting to be held in Toronto on February 2nd.

CANADIAN CREAMERY ASSOCIATION

At the annual meeting of the Canadian Creamery Association of Ontario held at Toronto in December resolutions were passed recommending that a conference of creamery manufacturers, similar to that held at the eastern dairy school last year, be held at the Guelph dairy school this year, that the provincial Department of Agriculture be requested to urge the farmers to store ice and that a special effort be made to have farmers in certain localities build cheap but efficient

ice houses and cooling tanks during the present winter and that same be used for demonstration purposes during the summer months.

The officers elected for 1920 were President, J. A. McFeeters; vice-presidents, Mr. W. MacWaddell, Strathroy; Mr. R. M. Player, Walkerton; secretary-treasurer, Mr. H. S. Johnston, Lindsay; representative to the National Dairy Council, Mr. Mack. Robertson, Belleville.

DUAL PURPOSE SHORTHORN CLUB

For the purpose of promoting the interests of the dual purpose strain of Shorthorn breed of cattle a club was organized on December 9th at Guelph. Over thirty breeders of dual purpose Shorthorns were present at the meeting held in the Guelph council chamber. The objects of the association are to bring out the milking qualities of the Shorthorns by keeping records; to breed uniform, true dual purpose cattle, and to encourage breeders to show at leading fairs and to enter dairy contests. The new organization, and the parent association

will work in harmony for the benefit of Shorthorn interests.

The following officers were elected,—Honourary Presidents, Hon. E. C. Drury, Toronto; Hon. Duncan Marshall, Alta., Mr. E. S. Archibald, Ottawa, and Dr. M. Cumming, Truro; President, G. S. Smith, Meadowvale; vice president, H. Scott, Caledonia; secretary, I. V. Whale, London, executive, Prof. G. E. Day, R. R. Wheaton and John Weld, besides these a board of directors was appointed.

CENTRAL CANADA VETERINARY ASSOCIATION

At the annual meeting of the Central Canada Veterinary Association held in Ottawa, January 14, the principal matters of public interest and of particular importance to the veterinary profession were brought up, including a paper on federal meat inspection.

Among the officers elected for the year are:—Hon. President, Dr. F. Torrance; President, Dr. Geo. Hilton; vice-president, Dr. J. P. M. Bordeau; secretary-treasurer, Dr. A. B. Wickware, Ottawa.

DAIRY TEST AT GUELPH

At the annual three day dairy test conducted at the Ontario Provincial Winter Fair, Guelph there were 97 entries in 1919 as compared with 96 in 1918. This number was made up of 47 Holsteins, 31 Ayrshires, 7 Jerseys, 7 Shorthorns, and 5 Grades. Only 54 of these qualified for prize money while in 1918, 63 qualified. The winner of the test was a mature Holstein cow, Roxie Colantha Queen, her total points reached 280.26 which was 37.37 points less than the number secured by Fayne Segis Pontiac

winner in 1918. All but two of the first 14 places in general standing among the prize winners this year were taken by Holsteins, the fourth place was taken by a Jersey, the sixth place was won by an Ayrshire. The second place in general standing this year was won by Lady Comet Ormsby with 278.84 points, Butter Girl Schuiling stood third with 270.61 points and Cornish Lodge Margaret Mercedes stood fifth with 257.68 points. The winners are tabulated on the following page.

RESULTS OF THE DAIRY TEST—GUELPH.

Age, Months.	Name.	Owner.	Results in 1919.			Results of Winners in 1918.		
			Lb. Milk.	Per Cent Fat.	Total Points.	Lb. Milk.	Per Cent Fat.	Total Points.
48 and over 36 and under 48 24 and under 36	Roxie Colantha Queen.....	HOLSTEINS. Charles C. Best, Jarvis. Jas. G. Currie, Ingersoll. J. B. Hammer, Norwich.	253.5	3.4	280.26	266.7	3.6	317.635
	Lady Comet Ormsby.....		192.7	4.7	278.84	219.1	3.9	271.138
	Belle Abbekerk 2nd.....		204.4	3.4	230.02	162.5	3.6	191.586
48 and over 36 and under 48 Under 36	Pearl of Balquido.....	AYRSHIRES. H. McPherson, Norwich Jno. McKee & Son, Nor- wich. H. C. Hammill & Sons, Markham.	185.2	4.4	255.16	201.8	4.65	290.588
	Freetrader's Sarah 2nd..		163.8	3.9	204.44	144.6	4.7	208.618
	Pansy of Craigelea.....		129.7	4.0	165.86	128.3	4.6	184.405
48 and over 36 and under 48	Fanny of Edgeley.....	JERSEYS. Jas. Bagg & Sons, Edge- ley. Fred. J. Bagg, Union- ville.	173.2	4.9	259.10	160.0	5.1	252.42
	Beauty Maid of Edgeley		121.6	4.4	167.2	124.4	5.1	169.924
48 and over Under 36	Butterfly Bellona.....	SHORTHORNS. S. W. Jackson, Wood- stock. S. W. Jackson.....	129.5	4.0	167.68	120.0	4.1	161.27
	Oxford Lady.....		92.4	3.8	113.52			
48 and over Under 36	Bloom.....	GRADES. Earl Grier, Woodstock... Earl Grier.....	197.1	3.0	200.30	215.7	3.2	231.437
	Nigger.....		159.4	3.2	174.80	164.5	2.9	164.898

DAIRY TEST AT AMHERST.

The following table gives the standing of the first cow in each section of the various classes competing at the dairy test held in connection with the Maritime Winter Fair at Amherst, N.S., December, 1919. The standing of the respective cows was computed on the following scale; 25 points for each pound butter fat; 3 points for each pound of solids not fat, and 1 point for each 10 days in milk after the first 30 days—limit 10 points.

According to the rules no first prize could be granted to a four-year old cow that did not produce at the rate of 10 pounds butter per week, or a second prize to one that did not produce at the rate of 8 pounds of butter per week. The rate for the third year class was 9 pounds and 7 pounds; second year class 8 pounds and 6 pounds, and the heifer class 7 pounds and 5 pounds per week respectively. Seventy-four cows were entered in the test.

Age, Months.	Name	Owner	Results in 1919.		
			Lb. Milk	Per Cent Fat	Total Points
SHORTHORNS					
48 and over....	Miss Springvale.....	Geo. M. Holmes, Amherst...	83.1	3.21	101.58
AYRSHIRES					
48 and over....	Gardrum White Floss.....	N.S. Agricultural College...	201.4	7.11	270.97
36 to 48.....	Lady Huntley.....	Geo. L. Boswall, French Fort, P.E.I.	143.2	5.71	182.01
24 to 36.....	Ruby of Melrose.....	A. MacRae & Sons, Charlotte- town, P.E.I.	108.8	3.55	117.45
Under 24.....	Brightside Bessie.....	Burt R. Brown, Royalty, P.E.I.	90.8	3.82	119.05
HOLSTEINS					
48 and over....	Cobequid Helbon Nellie.....	A. E. Dickie, Truro.....	235.7	7.90	257.07
36 to 48.....	Ruby Westboro Fayne.....	Fowler Bros., Amherst Point.	247.1	8.14	265.36
24 to 36.....	Eva Danforth.....	Dickie Bros., Onslow.....	194.5	6.08	198.62
Under 24.....	Bonnieview Helen.....	Dickie Bros., Onslow.....	129.1	4.78	153.79
GUERNSEYS					
48 and over....	Jennie of Spruce Grove.....	D. G. McKay & Sons, Scots- burn.	126.2	6.10	168.37
24 to 36.....	Queen Bess's Dolly of Spruce Grove	D. G. McKay & Sons, Scots- burn	89.1	3.78	117.36
Under 24.....	Mira of Willow.....	Roper Bros., Charlottetown, P.E.I.	63.9	2.88	94.13
JERSEYS					
48 and over....	Cream Ideal.....	H. S. Pipes & Sons, Amherst.	89.6	4.66	144.95
36 to 48.....	H. R. Fixit.....	H. S. Pipes & Sons, Amherst.	61.3	3.39	111.88
GRADES					
48 and over....	Ruby.....	Fowler Bros., Amherst Point.	216.0	7.18	233.80
36 to 48.....	Jewel.....	T. W. Keillor, Amherst Point.	174.7	5.21	171.50

DAIRY TEST AT OTTAWA.

The entries in the dairy test this year were larger than last. Only one Jersey competed. Several high class milking Shorthorns were entered, not to make high records, but to show this type of dual purpose animals. The championship in the test was won by Helen Mercena Posch winner in the aged Holstein class. She gave 204 pounds milk

and 9.71 pounds fat and her score was 293.07 points. On the following page the winners in each class taken according to ages and breeds are shown in table form, and their respective points are given. The results of last year's test are also given for comparison.

RESULTS OF DAIRY TEST—OTTAWA.

Age, Months.	Name.	Owner.	Results in 1920.			Results of Winners in 1919.		
			Lb. Milk.	Per Cent Fat.	Total Points.	Lb. Milk.	Per Cent Fat.	Total Points.
HOLSTEINS.								
48 and over.....	Helen Mercena Posch.....	A. E. Hulet, Norwich, Ont.	204.0	9.71	293.07	193.7	3.7	220.330
36 and under 48.....	Jenny Posch Abbecker.....	A. E. Hulet, Norwich, Ont.	114.0	4.15	134.18			
Under 36.....	Lady Segis Jewel.....	John B. Dowler, Billings Bridge, Ont.	201.5	6.23	208.91	162.5	3.7	194.803
AYRSHIRE.								
48 and over.....	Burnside Finlayston Blossom.	R. R. Ness, Howick, Que.	180.0	6.59	213.41			
36 and under 48.....	Lochfergus Jeanie.....	J. D. McDougall, Orms-town, Que.	127.9	5.68	182.8			
Under 36.....	Glenfergus Pansy.....	Gillespie Bros., Spencer-ville, Ont.	116.1	4.33	140.01	107.6	3.7	132.834
JERSEYS.								
Under 36.....	Buttercup Belle.....	John D. Ellis, Kingston, Ont.	77.6	3.67	122.19			
SHORTHORNS.								
48 and over.....	Roan Roaslyn (second).....	Alex. Maclaren, Buck-ingham, Que.	92.7	3.92	133.41	161.5	3.7	194.319
36 and under 48.....	Alice Cranford (second).....	Alex. Maclaren, Buck-ingham, Que.	88.0	3.39	118.97	94.7	3.4	111.676
Under 36.....	Willowdale Daisy.....	Alex. Maclaren, Buck-ingham, Que.	98.0	3.59	120.17			
GRADES.								
48 and over.....	Fanny.....	T. A. Spratt, Billings Bridge, Ont.	204.2	7.48	240.88	213.6	3.3	230.310
36 and under 48.....	Black Cat.....	J. B. Dowler.....	150.0	6.44	203.84	169.5	3.5	204.512
Under 36.....	Blossom.....	Dowler Bros.....	150.9	4.78	157.79	170.0	3.6	199.760

QUEBEC POMOLOGICAL AND FRUIT GROWING SOCIETY

The winter meeting of the Pomological and Fruit Growing Society of the province of Quebec was held at Macdonald College on December 3rd and 4th. An apple show was held in connection with the meeting. Resolutions were passed urging the Quebec Department of Agriculture to establish stations for the breeding and testing of varieties of fruits; asking the federal Department of Agriculture to increase the area devoted to plant breeding in the experimental farms system; recommending higher rates of salary than now obtain for technically

trained agriculturists; recommending to the federal and provincial governments the establishing of a national apple exhibition and the accomplishing of the organization of a Dominion fruit growers' association. The following officers were elected: President, C. E. Petch, Hemmingford, Que.; vice-president, J. H. Lavoie, Quebec, Que.; secretary-treasurer, Peter Reid, Chateauguay Basin, Que. It was decided to hold the next convention at Aylmer, Que., when occasion will be taken to visit the Central Experimental Farm.

ONTARIO UNITED FARMERS' CO-OPERATIVE COMPANY

The sixth annual meeting of the United Farmers' Co-operative Company was held in Toronto on December 16th. The report of the manager showed that the business had greatly increased especially during the past year, the total sales in 1914 amounting to \$33,000 and in 1919 they amounted to \$8,500,000. The opening of the live stock department at the Union Stock Yards, Toronto, opened a new and very important field. During the eight and a half months

that this department was in operation 3,000 car loads of live stock were marketed for almost \$6,500,000. The co-operative trading department operates branch stores and warehouses at Seaforth, Warren Fenelon Falls, Smith Falls, Cobourg, Kingston, Aultsville, and Toronto.

The following officers were elected, President, A. A. Powers, Orono; vice-president, Elmer Lick, Oshawa; secretary, J. J. Morrison, Toronto.

ONTARIO SEED GROWERS' ASSOCIATION

The annual meeting of the Western Ontario Seed Growers' Association was held in the Council Chamber of the City Hall Guelph, on Tuesday, December 9, 1919.

The following officers were elected: President, W. J. Squirrell, O.A.C., Guelph; vice-president, R. R. Moore, Norwich; secretary-treasurer, W. J. W. Lennox, Toronto.

The following resolutions were carried:

(a) That a report be filed with the federal Seed Commissioner recording the number of entries in the respective competitions, and

that this Association be recorded as being in favour of equal distribution of the Dominion Department of Agriculture's Grant to Provincial Seed Exhibitions among the three competitions—namely, Standing Field Crop, Canadian Seed Growers' Association and Open Competition.

(b) That the Seed Commissioner be asked to consider the advisability of regulating the sale of alfalfa seed in Canada, similar to that governing corn.

ONTARIO VEGETABLE GROWERS' ASSOCIATION

At the annual meeting of the Ontario Vegetable Growers' Association held in Ottawa on January 14, the following officers were elected for 1920: President,

W. S. Eborall, Beamsville; 1st vice-president, Maurice May, Tecumseh; 2nd vice-president, G. H. Poad, London; secretary-treas., J. Lockie Wilson, Toronto.

DAIRYMEN'S ASSOCIATION OF EASTERN CANADA

Among the resolutions passed by the Dairymen's Association of Eastern Ontario at their annual conference held in January were:—1st, that the executive of the association be authorized to take immediate action in regard to matters affecting the interests of the dairymen; 2nd, that the association favours the immediate action of the federal and provincial departments of agriculture towards eliminating the scrub bull; 3rd, that the federal government be requested to oppose with fullest power any

attempt at fixing the price of dairy products; 4th, that purchase of milk on butter fat basis be substituted for the present system and a recommendation for the bringing into force of the Dairy Standards Act with whatever amendments may seem necessary.

The officers for the year are:—President, Wm. Brown Dickinson's Landing; vice-presidents, George Smith, Iroquois, and M. N. Empey, Napanee; secretary, T. A. Thompson, Almonte.

MANITOBA MILK PRODUCERS ORGANIZE

The Manitoba Milk Producers' supplying milk to the Winnipeg market unanimously decided, at a representative meeting, to cast their lot with the Manitoba Grain Growers' Association. Milk shippers will be expected to join the local association in the district in which they live, or in the absence of an association they will assist in organizing one. The organization will then be known as the Milk Producers' Group of the Manitoba Grain Growers' Association. A committee of milk producers appointed at this meeting

will act with the Grain Growers' Association as a standing committee for the purpose of dealing with milk producers' problems. The committee are as follows: Y. W. Lorell, Elm Grove; Mr. Townsend, Clandeboyne; Mr. Britton, Letelier; Mr. Cradock, Woodlands; Captain Max Meincke, Headingly; and W. Oakley. The meeting favoured the appointment of a standing committee of nine to fix the price of milk from time to time.

BRANDON WINTER FAIR AND LIVE STOCK ASSOCIATION

A feature of the annual meeting of the Brandon Winter Fair and Live Stock Association held at Brandon on December 19, 1919, was the resignation of the President and all the old directors of the association. These men resigned of their own accord in order that new blood might be injected into the organiz-

ation for the coming year. The new directors elected for 1920 are as follows:—W. J. McCombe, Dr. S. A. Coxe, A. P. Philips, O. Harwood, A. R. McDermid, J. J. Kilgour, W. V. Morton, and G. R. Coldwell, K.C. Kenneth Campbell was elected President of the association succeeding Mr. McGregor.

BRANDON WINTER FAIR AND FAT STOCK SHOW

Dates have now been set for the Brandon Winter Fair and Fat Stock Show which will be held from March 1st to 5th inclusive.

The seed grain fair in connection therewith is to be revived and liberal prizes are being offered in all grain classes. As usual there will be a large poultry show. It is expected

that there will be 300 head of stall fed cattle and the boys steer feeding class will be larger than ever. An interesting feature will be the car lot classes brought out by the offering of handsome prizes by the Dominion Live Stock Branch.

SASKATCHEWAN CATTLE BREEDERS' ASSOCIATION

At the general meeting of the Saskatchewan Cattle Breeders' Association held in Regina on November 26th the question of a bigger and better cattle sale was carefully reviewed and after some discussion it was decided to hold a great three day cattle sale in Regina during the second week in March. It was also decided that the various breeds would be judged and sold on different days so that breeders who wished to secure one particular breed would not need to spend any unnecessary time at the sale but could come on the particular day on which the breed they were interested in was being sold. The first day is Aberdeen-Angus day and the dairy breeds will be judged and sold on the same day after the Aberdeen-Angus sale is completed. The second day will be devoted to Herefords, and the third day will be for Shorthorns.

In order to raise the standard of these sales as high as possible the entry fee for each animal has been raised from \$3 per head to \$10.00. This will have some effect in keeping inferior stock away from the sale. The commission charged on each sale has been reduced from 3 per cent to 1 per cent as the increased entry fee will produce sufficient funds to cover the expense of the sale. A high commission penalized high priced animals, whereas a low commission and a high entry fee is to the advantage of high grade stock. An age limit of animals was set because the association is determined that the sale shall be no dumping ground for aged animals that have passed their usefulness. These rules will be strictly enforced. The secretary of this association is J. G. Robertson, Live Stock Commissioner, Department of Agriculture, Regina, Sask.

ALBERTA ABERDEEN ANGUS BREEDERS' ASSOCIATION

The annual meeting of the Alberta Aberdeen-Angus Breeders' Association was held at Calgary on December 10th. The Association by vote of its members decided to affiliate with the Western Livestock Union. Mr. Lew Hutchinson, of Duhamel, was appointed the representative in this regard. The next annual meeting will be held at

Calgary in December, during the Fat Stock Show week.

The following officers were elected: Honorary president, G. H. Hutton, Lacombe; president, Chas Ellett, Strathcona; 1st vice-president, J. F. Day, Red Deer; 2nd vice-president, J. J. Bell, Islay; secretary-treasurer, N. F. Bell, Islay.

ALBERTA BREEDERS ASSOCIATIONS

The various live stock associations of Alberta held their annual meeting during the Calgary Winter Fair. Matters of general importance were dealt with and in each case officers for the coming year were elected.

THE CLYDESDALE ASSOCIATION

It was announced at the Clydesdale Association meeting that "Signet" one of the good horses in Scotland which the Alberta Government attempted to purchase for Clydesdale breeders of Alberta is not for sale. Scotland does not wish to allow this outstanding horse to leave her shores. It is predicted that many foals will be entered in the futurity class to be held at Edmonton next summer.

THE SWINE BREEDERS' ASSOCIATION

Owing to the fact that very few hogs are being kept for feeding purposes this winter two members of the Alberta Swine Breeders' Association, George Hutton, and E. L. Richardson, were appointed to interview the federal Minister of Agriculture with reference to encouraging the swine industry of the province. The officers appointed for 1920 were President, F. H. Herbert, Medicine Hat and a board of directors.

THE SHEEP BREEDERS' ASSOCIATION

At the meeting of the Sheep Breeders' Association J. W. Renton, Calgary, was elected president, and a board of twelve directors was appointed to act with him.

ALBERTA MILK PRODUCERS' ASSOCIATION

The milk producers shipping to the Calgary market have organized themselves into the Calgary District Milk Producers' Association. They feel that they will now be able to guard their interests as dairymen against vicious city-bred opinions which in the past have been very detrimental to them. The president elected is Keyes Culler, Elm River; vice-president, Will Roger, Shephard. In addition a board of twelve directors was

appointed. Initial membership numbers eighty and it is anticipated that every shipper to the Calgary market will be enrolled.

An organization similar in nature and having identically the same objects has been formed in the vicinity of Edmonton. It is now under way and hopes to stabilize the dairy industry in that district.

BRITISH COLUMBIA FRUIT GROWERS' ASSOCIATION

Owing to the great damage suffered by fruit and truck growers during the last two years by late spring and early fall frosts, which could have been avoided had local warnings been available, the executive of the British Columbia Fruit Growers' Association at a meeting held in Vancouver, November, 1919, passed the following resolution. That

the Dominion Meteorological Department be respectfully urged to supply daily weather forecasts for the fruit growing sections of this province; and further, that frost warning stations be established in the more important fruit and truck growing sections from April 20th to June 30th and from October 1st to November 10th.

NEW PUBLICATIONS

DOMINION.

The Report of the Minister of Agriculture for the Dominion of Canada for the year ending March 31, 1919. This report gives full information regarding agricultural legislation, activities of the various branches of the Department, reports of the Experimental Farms and Stations, and the activities of the Health of Animals Branch together with statistics covering agricultural progress and development throughout the Dominion.

QUEBEC.]

Bulletin 63, Small Fruit Culture by F. Petraz, Inspector of Horticulture, with the collaboration of J. H. Lavoie, Chief of the Horticultural Department gives detailed information regarding small fruits, their origin, cultural requirements, propagation, etc.

The Report of the Minister of Agriculture for the province of Quebec, 1918-1919, reports in full the activities of the various branches of the agricultural industries in that province together with detailed statements regarding the agricultural schools and colleges.

ONTARIO

The Report of the Women's Institutes, 1918, issued for the province of Ontario. The 18th Annual Report is issued in two parts. Part 1 summarizes briefly the reports of work done and the outline of plans as given by the superintendent and delegates at the convention. Part 2 gives a list of meetings and lectures with their subjects for the year 1918.

The Annual Reports of the Dairymen's Associations 1918 for the Province of Ontario, are issued in one volume. This includes the Forty-second Annual Report of the Dairymen's Association of Eastern Ontario and the Fifty-second Annual Convention of a similar association of Western Ontario for 1918. Besides recording the addresses given at the annual convention, complete information with reference to the dairy industry in Ontario is presented.

SASKATCHEWAN.

Co-operative Live Stock Marketing by W. W. Thompson, B.S.A., is an up to date treatise on organization of co-operative live stock associations, the live stock industry in Saskatchewan and, besides containing information relative to the Stock Yards of the western provinces, it gives points regarding the classification of animals and shipping of consignments.

The Seventh Annual Report of the Live Stock Commissioner of the year ending April 30th, 1919 for the province of Saskatchewan reports the conditions of the live stock industry in

the province in detail. In appendix A are reports of the various live stock associations of the provinces and appendix B gives the report of the Saskatchewan Live Stock Board.

The Thirteenth Annual Report of the Dairy Commissioner for the twelve months ended April 30, 1919, is issued by the Saskatchewan Department of Agriculture. With it is published an appendix of the tenth annual convention of the Saskatchewan Dairymen.

MISCELLANEOUS.

Vol. V of the Canadian Aberdeen-Angus Herd Book, compiled and edited in the office of the Canadian National Live Stock Records, Ottawa, 1919, contains pedigrees from 13601 to 20869, inclusive, along with the index to animals, conditions, and by-laws, list officers, etc.

Municipal Markets in Cities Having a Population of Over 30,000, 1918, issued by the Department of Commerce, Washington, U.S.A., presents data relating to the organization, class of employees, area of buildings, rentals, and methods of operation of markets together with the revenues, cost and valuation of these enterprises and the indebtedness of their account outstanding at the close of 1918. It contains valuable information for the use of civic authorities.

The Soldier Colonists by W. H. Warman, published by Chatto and Windus, London, England, is a new book which sets forth a plea for group organization in the establishment of soldier settler, colonists. The problems involved in the civil re-establishment are clearly and intelligently dealt with.

NOTES

There are 120 Rural Education Associations in Saskatchewan. Of these, 105 successfully conducted school fairs last year.

The Toronto Red Cross Flower committee received from the city park commissioner 1,000 potted plants at Christmas for distribution among the various military hospitals.

The Peterboro Horticultural Society in November distributed, 3,600 imported bulbs to its 300 members. The bulbs were hyacinths and narcissus. These distributions are a regular fall feature.

During the past summer 100,000 acres of Hudson Bay reserve land in Manitoba, Saskatchewan, and Alberta have come into the hands of the Dominion government and will be used for soldiers' settlement farms.

Mr. C. F. Bailey, Agricultural Commissioner for Ontario, has relinquished his

office to take the management of the Royal Agricultural Winter Fair Association, with headquarters at Toronto.

The Soldier Settlement Board has entered into an arrangement with a number of agriculture journals whereby land settlers under the Soldier Settlement Act are granted reduced subscription rates.

In connection with the Improved Sires Campaign going on in South Dakota, a survey of the sires in herds of cattle has been made when it was found that 65 per cent of the bulls used were grades or scrubs, and of the pure breds 25 per cent were classed as inferior.

An agreement has been made between the Canadian Swine Breeders' Association and the American Berkshire Breeders' Association by which there is a mutual reciprocity in the registration of swine either American bred, Canadian bred or imported from Great Britain.

Mr. J. A. Ruddick, Dairy and Cold Storage Commissioner for Canada, has been elected chairman of the committee on the general applications of refrigeration to food products. Mr. Ruddick's election took place at a meeting of the general council of the International Association of Refrigeration held in Paris in December.

A four days' course in fruit and vegetable gardening given at Macdonald College, Que., on February 3, 4, 5 and 6 was arranged for the benefit of both the practical grower and the amateur and the subject was treated not only from the lecture standpoint but by demonstrations in class room and greenhouse.

The St. Thomas Horticultural Society during the past fall has planted more than 22,000 tulip bulbs. It is estimated that with the additional planting done by hundreds of flower lovers, about private residences, schools, etc., that over 40,000 bulbs, the majority being choice imported Holland stock are planted for beautifying the city next spring.

The by-law submitted to the citizens of Toronto on January 1 for the authorization of the expenditure of \$1,000,000 for a live stock arena on the grounds of the Canadian National Exhibition was carried by a vote of 17,371 to 7,015. Building operations will likely be started promptly and the new arena may be ready for the exhibition in August of this year.

The Aero Club of Canada has been asked to assist in importing bees from the southern states into Canada during the coming spring. As bees should be imported at the right moment and without any loss of time the aeroplane may prove to be of great value. It is probable that the first cargo of bees to be carried by aeroplane will be carried by Canadian airmen for Canadian beemen.

Up to December 31, 1919, 338,000 members of the C.E.F. had been returned to Canada to resume civilian occupations. Of this number 44,278 had by the above date applied to the Soldier Settlement Board for qualification certificates to enable them to take up land and secure the benefits of the Soldier Settlement Act. At the close of the year 33,496 applications had been approved.

The Fraser Valley Milk Producers' Association in British Columbia, which handles a large proportion of the milk produced in the Fraser Valley, have undertaken to deliver all eggs from its patrons. The arrangement to do this has been brought about by an agreement between the Poultrymen's Union and the Fraser Valley Milk Producers Association. The eggs like the milk will be delivered direct from the farmers to the consumers.

The Alberta Department of Agriculture has issued in poster form an illustrated synopsis of the Provincial Act respecting buying and selling of market eggs. The hanger gives the main provisions of the Act and shows by illustration the appearance of eggs affected with black rot, black spot and also new laid eggs when submitted to the candling test. These posters are exposed in public places and in grocery and other stores where eggs are bought and sold.

Prof. W. H. Brittain, B.S.A., head of the Department of Entomology at the Nova Scotia Agricultural College, has been granted four months leave of absence and left recently for Cornell University, Ithaca, N.Y., where he will pursue post-graduate studies for his degree of M.S.A. Mr. Brittain commenced his work along this line prior to the outbreak of the war, but due to curtailments on the staff of his department, was unable until now to complete his course.

The Central Experimental Farm at Ottawa has purchased two notable Clydesdale brood mares, Manilla and Syringa. A daughter of Manilla won the grand championship award at the Central Canada Fair in 1918 and 1919. March Past, a son, won the Canadian bred championship and reserve grand championship at the same exhibition. Manilla is a daughter of Bonnie Buchlyvie. Syringa, a daughter of Sir Spencer, is also a prominent prize winner and regular breeder. As a two-year old she won the grand championship award.

The Canadian Council of Agriculture in session at Winnipeg on January 5, after consideration of importing and exporting measures affecting foodstuffs, passed the following resolution; that the Canadian Council of Agriculture, while not at this time declaring upon the principle of governmental control as a permanent policy, believe it is desirable to continue national marketing of Canada's wheat product at least so long as the principal countries importing Canadian wheat retain governmental control of their imports and distribution.

To encourage the organization of live stock marketing associations, the provincial Department of Agriculture, through the co-operative organization branch, is prepared to supply to each association free of charge sufficient receipt and account forms to meet their requirements for one year, the only stipulation being that the association forward the co-operative organization branch a copy of the constitution and by-laws under which it purposes to operate. When desired the branch will send, free of cost, an experienced stockman who will assist any association in handling its first shipment.

The endless chain plan of operating a pig club has been worked out by the Co-operative Live Stock Development Association at Oklahoma City. A boy club member contracts with a local banker to take a registered bred sow and to care for her under the supervision of the county agent. The boy agrees to return in payment for his sow the choice of two sow pigs from the first litter produced, when they are eight months old, after which the sow and the rest of the litter become his property. The banker reimburses himself with one of the sows returned and lets the other out to a new club member. The sows are turned in and let out to new members thus extending the links of the chain.

In December about thirty members from the agricultural colleges, experimental farms, and departments of agriculture of Alberta, Saskatchewan, and Manitoba got together for organization purposes. Some of the problems discussed were the co-ordination of judging work in agronomy in the three prairie provinces; second, problems regarding the investigation and methods of teaching same; third, co-operative and extension work in

field husbandry, and fourth, miscellaneous topics. The purpose of organization is that the men engaged in provincial agriculture in the western provinces may be banded together for the purpose of mutual benefit and better service. The object as adopted in the constitution is "to encourage investigational work in crops and soils and to disseminate the knowledge concerning both and the conditions affecting them."

Three Red Cross outposts or health centres in the northern districts of Saskatchewan are being provided for the pioneer settlers who need nursing and medical help. This work is being undertaken by the Home Branch of the Soldier Settlement Board and the outposts are to be small hospitals with six or eight beds and accommodation for two nurses. The settlers will provide sites and erect log buildings while the Victorian Order of Nurses will supply nurses and the Red Cross will equip and maintain the outposts for at least two years or until they are self supporting. This is a distinctly human action and will more than be repaid by the added security felt by the people who are building the new country in the north.

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PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty, International Institute Commissioner, Department of Agriculture, West Block, Ottawa.

SCIENCE AND PRACTICE OF AGRICULTURE

GENERAL INFORMATION

International Year Book of Agricultural Legislation. 1918.—1198 pages. (Text in French only, with an analytical introduction and index in English). *International Institute of Agriculture*, Rome, Italy, 1919.

This is the eighth volume of the *Annuaire International de Législation Agricole*. It contains the agricultural legislation published in the different countries in the year 1918.

In the first part of the year book, which is concerned with agricultural and commercial statistics and with government measures for ascertaining the stocks of foodstuffs and primary materials, there are included measures aimed at the organization and regulation of the official statistical services in their general aspect and from the point of view of normal conditions. In the second part, which is given up to provisioning, consumption and trade, measures are grouped which are intended to ensure the supplies of countries, to restrain consumption and to prevent an excessive rise in prices, and also measures which aim at guaranteeing to farmers, even by means of State intervention, that they shall have at their disposal seed of good quality, unadulterated manures and agricultural machinery. In the third part, which deals with questions of finance and customs, there are found side by side with measures of a temporary kind for the raising of dues and taxes, other measures of which the tendency is to bring budgets back to their normal state, with due regard to the increase of the financial needs of States. The fourth part, which refers to vegetable production and the vegetable products industries, is still, as in former years, largely made up of provisions aimed at giving a vigorous impulse to the agricultural industry; they order the compulsory bringing under cultivation of uncultivated or insufficiently cultivated lands, and oblige persons able to work to contribute their energy to agriculture or industry. There are also in this part

measures for ensuring the restoration to cultivation of marshes and flooded land, and for simplifying, by giving landowners large facilities for meeting the necessary expenses, the procedure when drainage works are compulsorily executed.

The fifth part is concerned with animal production. It contains the provisions which limit the slaughter of live stock, and the measures which aim at encouraging stock breeding, especially with a view to the evolution of the best breeds. In the sixth part, which is given up to agricultural organization, those measures are grouped which are intended to regulate new agencies and new official institutions founded for the needs of the war, and also measures involving the constitution of new agencies intended to satisfy new needs, such as ministries for the reconstruction of devastated or liberated districts. The seventh part contains the measures which States, in their anxiety to ensure agricultural production as fully as possible, have taken to guarantee crops and plantations against diseases and noxious animals. The eighth part groups the measures which encourage the constitution of farmers' co-operative associations or federations, those which facilitate insurance against hail, those which make the insurance of agricultural labourers against accidents compulsory, and a series of provisions aimed at extending the advantages of credit to farmers, on favourable terms and with State help, notably to provide for the purchase of seed and agricultural machinery. The ninth part contains provisions which recognize the right of individuals to be compensated by their States for war losses, measures amending or completing the legislation passed in previous years to encourage the granting of lots of land for settlement, with credit facilities for discharged soldiers, and other measures which envisage the problem of agriculture from the point of view of normal conditions and are concerned with encouraging land settlement in the home country or freeing agricultural property from tithes or other burdens on land. In the

tenth part, which is concerned with the relations between capital and labour in agriculture, are measures aimed at regulating the clauses of agricultural leases, exempting tenants from obligation to carry out clauses which involve a prohibition or limitation of the cultivation of a property. There are also measures intended to guarantee to discharged soldiers the permanent employment or occupation which was theirs as civilians, and other measures aimed at instituting State-aided labour bureaus in order to secure the regular distribution of labour. In the eleventh part, given up to rural hygiene and the protection of crops, the measures are collected the object of which is to fight epidemic and endemic diseases in countryside and to prevent fires in rural areas.

The Year book may be obtained from the General Secretary, International Institute of Agriculture, Rome, Italy, for 15 francs (less than \$3). It is published in the French language only, but it contains an analytical introduction of over 40 pages in English and an English index. The seven previous volumes (1911-1917) may be obtained for 10 francs per volume.

The regular monthly publications which may also be obtained from the General Secretary are:

The International Review of the Science and Practice of Agriculture, 18 francs per annum; The International Review of Agricultural Economics, 18 francs per annum; The International Crop Report and Agricultural Statistics, 6 francs per annum; The Documentary Leaflets, 4 francs per annum.

Farming in the Devastated Areas of France.

—*The Board of Trade Journal*, Vol. CIII, No. 1200, p. 655. London, Nov. 27, 1919.

The French Ministry of Agriculture, after a careful survey of the devastated regions in the northern part of the country, estimates that all but a very small percentage of the land that was formerly devoted to cultivation can be brought back to a productive state within a period of perhaps four years. Much progress has been made by the salvaging troops in clearing away the debris of war and in filling in the network of trenches and the scattered shell holes in the back areas.

The government gives the total area directly affected by the war operations as 9,457,500 acres, of which 7,092,500 acres were under cultivation. The zone completely destroyed is 3.8 per cent of the total area under cultivation; the zone of trenches and heavy bombardment 28.4 per cent; and the area only slightly damaged 67.8 per cent.

The Antiscorbutic Value of Cabbage.—

DELLE, E. M., in *Biochemistry Journal*, Vol. 12, No. 4, pp. 416-477, 1918.

The author reviews the work of Holst and Frolich on the antiscorbutic value of fresh raw cabbage and of cooked cabbage, and reports an extensive study of the same sub-

ject, using guinea pigs as the experimental animals.

The standard basal diet was a mixture of rolled oats and bran *ad libitum* with water and, in cases where the rations of cabbage were small with a daily supplement of 60 cc. of milk autoclaved for one hour at 120°C. The cabbage was given in the green leaf.

From the series of experiments with raw cabbage the conclusion is drawn that under the conditions of the experiment a 1 gm. ration of fresh cabbage may be regarded as the minimum for protection from the symptoms usually diagnosed as scurvy. On a 0.5 gm. ration, well marked symptoms of scurvy were obtained. Apparently satisfactory growth and health were obtained with from 1.5 to 5 gm. when 60 cc. autoclaved milk was added daily to the diet, although suggestions of soreness during life and the histology of the bone cartilage junctions indicated a condition of incipient scurvy. With a ration of 30 gm. of fresh cabbage, normal growth took place with an increase of about 100 per cent in 90 days.

A comparative study of the antiscorbutic value of cabbage after exposure to various temperatures for different intervals of time showed that the antiscorbutic factor is exceedingly sensitive to temperatures below 100°. The rate of destruction, however, is increased only about threefold for an increase in temperature of 30 to 40°, as shown by the fact that 5 gm. of cabbage cooked for one hour at 60° was about equal in antiscorbutic value to 5 gms. of cabbage cooked at 100° for 20 minutes and to 1 gm. of raw cabbage. It is pointed out that this low temperature co-efficient is in opposition to the view that the antiscorbutic factor is a complex protein or an enzym like substance.

In applying the foregoing results to methods of cooking vegetables, the author points out that slow cooking at a low temperature is much more deleterious than more rapid cooking at a high one, and that, consequently, as far as antiscorbutic value is concerned, the longer time needed in a fireless cooker is a greater disadvantage in the case of green vegetables, such as cabbage. Evidence is also given that vegetables should be steamed rather than boiled in water, and if boiled should be boiled in water only, the addition of either acid or alkali to the water increasing the loss of antiscorbutic vitamins.

In experiments in which larger rations of cabbage were given heated to temperatures from 100 to 130° for periods of one to two hours, the destruction of antiscorbutic properties, though extensive, was less complete than was to be expected from the results at lower temperatures. A suggested explanation of this discrepancy is that the antiscorbutic value of a diet may be enhanced and may show greater heat stability when the antiscorbutic factor and the growth fat-soluble factor are derived from the same foodstuff. The greater heat stability of the fat-soluble factor is also shown from the fact

that heating for one to two hours at temperatures from 100 to 120° produced only a slight effect.

The article concludes with an appendix by F. M. Tozer on the histological diagnosis of experimental scurvy, with diagrammatic drawings made from histological preparations of the rib junctions of animals used in the experiments described and which demonstrate the more important histological changes observed in animals suffering from scurvy in varying degrees. The diagnosis made from the histological preparation independently of the diagnosis of the condition seen during the life of the animal or in postmortem examination in most cases tallied closely with the latter.

CROPS AND CULTIVATION.

The Movement of Plant Food Within the Soil.—VAN ALSTINE, E., in *Soil Science*, Vol. 6, No. 4, pp. 281-308. Baltimore, Md., 1918.

This paper, a thesis presented to the Graduate School of the University of Illinois, describes investigations in which a study was made of the total amount of the various plant food elements present in samples of soil from long-time fertilizer plats, including the "park" plats at Rothamsted and the plats of the Pennsylvania and Ohio experiment stations, in order to determine the ultimate fate of the fertility elements added to the soil as fertilizers when not completely removed by the crop. The total amount of organic carbon, nitrogen, phosphorus, potassium, magnesium, and calcium was determined in the Rothamsted soil for samples representing strata of from 0 to 3 in., 3 to 6 in., and 6 to 9 in., respectively. In the case of the Pennsylvania and Ohio soils the observations were confined to a study of the phosphorus content of strata from 0 to 6½ in., 6½ to 13½ in., and 13½ to 20 in.

Summarizing the results secured, the author concludes that when phosphorus is used as a fertilizer, it remains almost where it is placed in the soil until removed in crops or removed by some such process as erosion by water or wind action. The addition of alkali salts (sulphates of potash, soda, and magnesia) seems to encourage the utilization of phosphorus from the surface stratum, especially by legume plants, which probably also secure nitrogen chiefly from the soil air in the surface stratum. There may be some loss of nitrogen through drainage, but when other fertility conditions are right and crops are kept on the ground all through the growing season, this loss is very small and there is a tendency for nitrogen, added in the form of ammonia, to accumulate in the surface soil, probably in plant roots and residues. Potassium, though easily and quickly fixed in soil, is more subject to movement within the soil as a result of fertilizing with other salts and in this way may be leached beyond the reach of plant roots. Carbonates are rather easily washed from the soil even when

no other treatment is given, but much more readily washed out when ammonium salts are used. The loss of magnesium is brought about by the use of ammonium salts as fertilizers. Calcium decreases with the loss of carbonates. Also, when alkali fertilizer salts are applied, it decreases more rapidly than acidity develops. Ammonium salts cause as marked a loss of calcium as of carbonates, and its loss occurs relatively as rapidly as the acidity develops. A list of references cited, comprising 45 titles, is appended.

Fertilizing the Corn Crop.—THORNE, C. E., in *Monthly Bulletin, Ohio Experiment Station*, No. 4, pp. 99, 100. Wooster, Ohio, 1919.

Briefly reviewing soil fertility work conducted at Wooster and on outlying experiment fields, it is advised that from 150 to 200 lbs. per acre of acid phosphate or steamed bone meal be applied to corn, with the expectation that while the first year's increase may be small, the systematic repetition of the treatment will be profitable. It is recommended, further, that the fertilizer be applied broadcast, and not only in the hill or drill, in order that succeeding crops may benefit more fully from the unexhausted fertilizer residues.

Some Details About the Alsatian Potash Fields.—*American Fertilizer*, Vol. 50, No. 3, p. 45. 1919.

It is stated that there are at present approximately 100 fields in Alsace for which concessions for potash working have been granted, of which about 80 are considered workable.

The thickness of the deposits in Alsace ranges from 2 to 10 metres (6.56 to 32.8 ft.); the quantity is estimated at 1,472,058,000 tons of potash salts, which represents about 300,000,000 tons of pure potash. The advantages are that the deposits are uniform; the potash content with 15 to 20 per cent and more, on the average, is higher than in Central Germany, and concessions are practically unnecessary for the disposal of the discharged water. On the other hand, the disadvantages are that it is difficult to produce sulphate.

The Influence of Crop Plants on Those which Follow.—HARTWELL, B. L., Pember, F. R., and MERKLE G. E., in *Rhode Island Experiment Station Bulletin* 176, pp. 4-48. Kingston, R.I., 1919.

Supplementing experimental work conducted in the field pot experiments begun in 1911 are described in which further observations were made on the effect of different crops on those grown subsequently. The investigations were divided into two parts, one conducted in Wiley pots in the greenhouse to study the effect of onions, buckwheat, rye, and redtop on onions and buckwheat when grown with an optimum supply of nutrients; with nitrogen, phos-

phorus, and potassium each omitted; and with half more than the optimum supply of nutrients; and the other made in ash cans sunk in the ground out of doors in which observations were made on the effect of onions, buckwheat, rye, redbot, and mangels on onions and buckwheat when the crops were grown with different amounts of nitrogen. Applications of lime were made to all pots at the beginning of the experiment and again 3 or 4 years later. Data showing the crop yields and the amount of nutrients removed in the different crops are presented in tabular form with full discussion and may be summarized as follows:

When onions were grown after the different crops had occupied the soil 2 or 3 successive seasons, the yields increased after the crops in about the following order: Buckwheat, mangels, rye, onions, and redbot. When buckwheat was grown uniformly, the yield increased in order after redbot, buckwheat, mangels, rye and onions. With the different fertilizer treatments the relative effect of the several crops varied somewhat, depending upon the treatment, but not so much as generally expected. Chemical analyses of the crops are held to indicate that changes in the percentage composition of a crop brought about by a given application of the nutrient depended not only upon its effect upon the rate of growth but also upon the abundance of the other nutrients in relation to the needs of the crop. In general it appeared that the nutrients actually required for the normal growth of the crops need not exceed in dry material 2 per cent nitrogen, 1.5 per cent potassium oxide, and 0.5 per cent phosphoric oxide, providing an adequate supply of other ingredients is available to furnish the indifferent ash. As indicated by the field experiments, the divergent effect of crops on those which follow seems not to be attributable, at least principally, to differences in the amount of nutrients removed by the crops grown previously—that is, the smallest yield may not occur after the crop which removed the largest amount of even the most-needed nutrient.

The soil acidity was affected differently by the various crops. Onions, said to be sensitive to conditions accompanying acidity, showed the best yields after crops giving rise to the least acidity. The effects of the crops on those which followed were observed to be much less divergent when the soil acidity was reduced by liming. Even the preceding crop effects may prove to be relatively unimportant on neutralized soil. It is suggested that for practical purposes the potent influences observed in these investigations should receive careful attention, since many soils exhibit a higher degree of acidity than existed in the experimental soil and it is regarded as doubtful whether they would ever be limed sufficiently to maintain them in a neutral condition.

Potato Studies.—WOODS, C. D., in *Maine Agricultural Experiment Station Bulletin* 277, pp. 17-32. Orono, Maine, 1919.

This bulletin comprises a discussion of the food value and mineral content of Maine grown potatoes, the utilization of potato pomace, ridge and level culture for potatoes previously noted, and a continuation of observations on nitrogenous fertilizers for potatoes on Aroostook farm and on the effect upon the potato crop of omitting potash fertilization.

A comparison of analyses of Maine grown potatoes with similar analyses of potatoes from other American sources is held to indicate that Maine potatoes contain approximately 1.5 per cent more dry matter than all other American potatoes. Spraying potatoes with Bordeaux mixture has resulted in an increase both in the yield of marketable tubers and in the starch content. Steaming potatoes appeared to have little effect on the composition of the dry matter. In feeding experiments with sheep in which raw and cooked potatoes were compared, the dry matter, organic matter, and the starch of the nitrogen free extract were found to be somewhat more completely digested in the cooked than in the raw material. Similar tests with pigs resulted in a gain of 60 lbs. each in 44 days for pigs fed with raw potatoes as compared with a gain of 67 lbs. for those fed steamed potatoes.

Based on the results of an analysis of the ash of Maine grown potatoes, it is estimated that a 250-bushel crop weighing 150 cwt. would remove 56 pounds of ammonia, 20 pounds of phosphoric acid, 72 pounds of potash, and 1.5 pounds of lime from the soil.

The composition of potato pomace, left as a residue from the manufacture of potato starch, is compared with that of potatoes and the conclusion reached that under present conditions its profitable utilization in this country is not possible.

Fertilizer tests begun in 1914 to determine the best source of nitrogen for potatoes in Aroostook county were discontinued with the 1918 experiments, the results of which confirmed the earlier findings. It is stated that there is apparently little choice in the form of nitrogen to be used on potatoes in this region, and it is suggested that in the fertilizer employed one-third of the nitrogen be supplied from nitrate, one-third from ammonium sulphate, and one-third from high-grade organic matter.

Further observations on the omission of potash in fertilizer tests with potatoes, begun on Aroostook farm in 1915, have led to the following conclusions: Good yields were secured without potash. The application of 300 pounds of common salt per acre resulted in a small but uniform increase in yield over the untreated plot. The application of 45 pounds of potash per acre (equivalent to 1,500 pounds of 3 per cent goods) produced a uniform and profitable increase in yield on Caribou loam, while larger ap-

plications were not proportionately more profitable. Finally, nitrogen and not potash appeared to be the limiting factor in potato production on this soil.

The Healing of Pruning Wounds.—BRIERLEY, W. G., in the *Minnesota Horticulturist*, Vol. 47, No. 4, pp. 145-152. Minneapolis, 1919.

An extensive study was made of pruning wounds on apple trees in the Minnesota Experiment Station orchards and in several other orchards, including young and old trees as well as neglected and well-kept trees. Data are given showing the relation of size and treatment of wounds to healing and the causes of failure to heal in well-made wounds.

The results of the study show that there is very little variation in the percentage of wounds healing on a basis of size of wounds, although larger wounds heal more slowly. The rate of wound healing was directly proportionate to the vigour of the tree. For all wounds examined, a general average of 93.7 per cent were healing. Of the wounds not healing, poor pruning accounted for the failure of nearly 9 out of every 10. Out of 2,256 well-made wounds, only 17 failed to start healing. These failed chiefly from fire blight infection. Previous decay in wood and drying back of the bark caused a few failures.

A comparative study of protected and unprotected wounds indicated that protection with wax or paint is of little value unless the wound is well made and both wound and tools sterilized against disease. Paints and waxes often fail to prevent disease or decay, because infection may have reached the wound before the covering was applied.

The author calls attention to the beneficial results found in other investigations in protecting the heartwood of large wounds with gas tar or liquid asphaltum to prevent decay while the relatively slow healing process is going on. These materials, however, should not be applied to the sapwood and cambium, as injury may result.

LIVE STOCK AND BREEDING.

1204—Egg Weight as a Criterion of Numerical Production in the Domestic Fowl.—Hadley, P. in *Journal of the American Association of Instructors and Investigators*; summarized in *Utility Poultry Journal*, Vol. IV, No. 7, p. 23. Harper Adams Agricultural College, Newport, Salop, 1919.

An enquiry was undertaken to ascertain whether computation based upon the weighing of only ten eggs laid as closely as possible to the periods of the absolute vernal and autumnal maxima respectively, would afford a satisfactory basis for computing the weight production correlations. This was attempted first for the period of the vernal maximum. To this end, therefore, the mean weight of ten eggs laid by each member of the flock

between April 11th and April 25th was computed, and the difference between the mean weight of these ten eggs and the mean weight of the first ten eggs laid by that hen at the beginning of her first laying year calculated as a percentage increase or a percentage decrease. It may be added that the April production was conducted at so rapid a rate that in the case of 28 individuals out of 37 it was possible to obtain the record of ten eggs within the dates mentioned. In the remainder of individuals it was necessary to transcend these limits slightly. In no instance, however, was it necessary to take eggs from a date earlier than April 8th, nor later than April 29th. From the data presented it is clear that the small group of hens characterized by a percentage increase in egg weight of more than 10 gave a higher mean production (142 eggs) than any group manifesting a smaller percentage of increase in egg weight. Each succeeding group, characterized on a smaller percentage increase, gave a correspondingly smaller annual production, until when we reach "0 per cent.," the group manifesting a decrease in mean egg weight, we find the mean annual production of only 106 eggs. When the flock is divided according as the mean percentage of increase is more than 6 or less than 6, we find that in the high percentage group there are 13 hens with a mean annual production of 138 eggs, while in the low percentage group there are 24 hens with a mean production of 109 eggs. In view of these results, obtained from the weighing of 10 eggs at the period of the vernal weight maximum, it seemed desirable to ascertain whether the same "ten egg method" at the period of the autumnal weight maximum would similarly serve to distinguish a group of hens characterized by the possession of higher producing ability. Accordingly the production data for September were analysed from this point of view.

In explanation of the September results, however, several points should be noted. In the first place, although September production represents a definite mode in the annual production curve when plotted on monthly ordinates, in the case of the flock studied the month's production falls considerably short of the April production. In April all members of the flock without exception were laying. In September there were four hens that did not lay at all; and three hens that laid only three eggs or less. In the re-distribution of the data for the present purpose the records of no hens are included that did not lay at least five eggs in September.

In the second place, it should be noted that the September production was scattered when compared with the April production; and although an attempt was made to secure eggs laid during the latter half of the month, it frequently happened that it was necessary to include eggs laid in the earlier part.

From the data presented it appears, as in the former case, that higher production is correlated with the higher percentages of

increase in egg weight. The maximum group production (147) occurred in those hens whose increase in mean egg weight was above 13 per cent. Selecting above 10 per cent. gave seven birds whose mean production was 143 eggs. Selecting above 6 per cent. gave twelve hens whose mean production was 139 eggs. On the other hand, selecting below 0 per cent. (i.e., birds showing a decrease in egg weight) gave five hens with a mean production of only 108.

The author concludes as follows: The innate egg-producing ability of a hen is manifested, not only by the number of eggs laid within a year or within some longer or shorter period of time, but also by the degree of increase or of decrease in the mean weight of her eggs, when this increase or decrease (calculated as a percentage-increase or percentage-decrease) is measured at those periods of laying (the vernal and autumnal maxima) characterized by the markedly increased production of the flock; and on this basis, groups of hens can be differentiated as accurately as, and more easily than, by any other means.

1211.—Nosema Disease.—WHITE, G. F., in *United States Department of Agriculture, Bulletin* 780, pp. 59. Washington, D.C. 1919.

This is a detailed report of investigations conducted by the author extending over a period of several years. The results, which are presented in detail, much of the data being recorded in tabular form, have led to the following summary and conclusions:

Nosema disease is an infectious disorder of adult bees caused by *Nosema apis*. The disease is not particularly malignant in character, being in this respect more like sacbrood than the foulbroods. Adult workers, drones, and queens are susceptible to infection but the brood is not. The infecting agent *N. apis* is a protozoan that attacks the walls of the stomach and occasionally those of the Malpighian tubules. A colony can be inoculated by feeding it syrup containing the crushed stomachs of infected bees. One-tenth of the germs present in a single stomach are sufficient to produce marked infection in a colony. Within a week following the inoculation the parasite can be found within the walls of the stomach. Before the close of the second week infection can be determined by the gross appearance of the organ. The disease can be produced at any season of the year by feeding inoculations. Infected bees may be found at all seasons of the year, the highest percentage occurring in the spring.

Nosema infection among bees occurs at least in Australia, Switzerland, Germany, Denmark, England, Canada, and the United States. This distribution shows that the occurrence of the disease is not dependent altogether upon climatic conditions. The course of the disease is not affected directly by the character or quantity of food obtained and used by the bees. A sluggish body of water, if near an apiary and used by bees as

a water supply, and the robbing of diseased colonies, must be considered for the present as two probable sources of infection. The transmission of the disease through the medium of flowers is not to be feared. The hands and clothing of the apiarist, the tools used about an apiary, and winds need not be feared as means by which the disease is spread. Hives which have housed infected colonies need not be disinfected, and combs from such colonies are not a likely means for the transmission of the disease. Bees dead of the disease about the apiary are not likely to cause infection unless they serve to contaminate the water supply. The temperatures required in various media for the destruction of *N. apis* are given, and the article continues as follows:

N. apis is readily destroyed by carbolic acid, a 1 per cent. aqueous solution destroying it in less than 10 minutes. The time element which by the experiments is shown to be sufficient for the destruction of *N. apis* should be increased somewhat to ensure their destruction in practical apiculture. The prognosis in Nosema disease varies markedly from excellent, in case of strong colonies with a comparatively small percentage of Nosema-infected bees to very grave, in case of weak ones with a high percentage of infected bees.

From a technical point of view the results here given must be considered as being approximate only. They are, however, in most cases sufficient for practical purposes.

FARM ENGINEERING

Imports of Agricultural Implements into France.—*The Board of Trade Journal*, Vol. CIII, No. 1200, p. 655. London, Nov. 27, 1919.

In addition to the machinery needed to restore French farming to its normal condition, there is an unusual demand for machinery to offset, in part, the loss which the war has entailed in depleting the supply of labour on the farms, as well as the supply of horses. The war has done much to arouse interest in "motor-culture" or tractor farming. The Government has taken active interest in the introduction of tractors, and not only bought directly from American manufacturers some hundreds of machines for use in the devastated areas, as well as in other parts of the country, but has arranged subventions whereby individual farmers can buy tractors through their local agricultural syndicates, the Government paying a certain part of the cost price.

According to the French Ministry of Agriculture there are only 138,000 farms or estates in France containing 100 acres or more, out of a total of 5,688,000 farm units.

During the first year of the war the exports of agricultural implements from the United States to France fell to about one-quarter of the volume of the previous year. For a similar period at the close of the war the volume was about one-third that of the last

pre-war year, according to the preliminary figures issued by the French Government.

The following figures, taken from official reports of the French Government, show

by weight the imports of implements into France from Great Britain, Germany, Belgium, Canada, and the United States for the years 1911 to 1915:—

Imported from.	1911.	1912.	1913.	1914.	1915.
	Tons.	Tons.	Tons.	Tons.	Tons.
Great Britain.....	3,632	3,133	3,196	2,563	481
Germany.....	3,383	3,346	3,248	1,570	.....
Belgium.....	1,095	1,424	1,783	968	.....
United States.....	24,656	21,774	23,360	28,499	7,954
Canada.....	2,751	1,217	5,711	7,632	512
All other countries.....	651	597	1,109	527	115
Total.....	36,168	31,491	38,397	41,759	9,062

The French imports of farm implements from all countries in 1916 was 21,499 tons; in 1917, 17,509 tons; and in 1918, 15,099 tons. Detailed statistics for these years are not yet available.

The most important items making up the total tonnage from all countries for the years 1912 to 1915 were:—

Mowers, 8,814 tons in 1912, 10,460 in 1913, 14,046 in 1914, and 5,471 in 1915.

Reapers, 4,654 tons in 1912, 2,580 in 1913, 4,383 in 1914, and 530 in 1915.

Binders, 8,434 in 1912, 15,234 in 1913, 16,941 in 1914, and 621 in 1915.

The Farm Tractor in the Dakotas.—YERKES, A. P., and CHURCH L. M., in *United States Department of Agriculture, Farmers' Bulletin* 1035, pp. 32. Washington, D.C. 1919.

This reports data obtained from over 300 tractor owners in North and South Dakota, based on operating results during the fall of 1917 and spring and fall of 1918.

It was found that the principal disadvantage of the tractor in the Dakotas lies in its inability to do satisfactory work under moist soil conditions. Difficulty of efficient operation was the next disadvantage.

Of the farmers reporting, 44 per cent were able to increase the farm acreage. Over half of those reporting owned 3-plough machines, the remainder being about evenly distributed among the 2-plough, 4-plough, and larger sizes. After using these tractors nearly the same percentage recommended the 3-plough tractors as owned them, 30 per cent recommended the 4-plough tractor, and only 5 per cent recommended the 2-plough tractor. The minimum number of acres on which the 2, 3, or 4-plough outfits were profitable were 185, 225, and 314 acres, respectively.

The tractors were used an average of 50 days annually, about 40 days on home work and 10 days on custom work. The number of days the tractor was used on home work increased rapidly with the size of the farm, and the number of days on custom work decreased gradually.

The average quantity of fuel consumed per acre in ploughing was $2\frac{1}{2}$ gallons. The fuel cost per acre for ploughing averaged about 38 cents for kerosene and 69 cents for gasoline. The average cost per acre

for ploughing for fuel, oil, and grease was about 78.5 cents, where gasoline was used and 49 cents where kerosene was used. The cost for repairs for 2, 3, and 4-plough outfits averaged 15, 13, and 11 cents per acre ploughed, respectively, and the corresponding average depreciation, assuming a 9-year life for a tractor, was estimated at 41, 36.5, and 31½ cents. The cost per acre for man labour at \$4 per day for the 2, 3, and 4-plough outfits averaged 63.5, 47, and 36½ cents, respectively, and interest at 6 per cent averaged 11, 10 and 8.5 cents, respectively, per acre ploughed. The total approximate cost of ploughing an acre, using kerosene for fuel, averaged \$1.80, \$1.56, and \$1.38 for the 2, 3, and 4-plough outfits, respectively, and where gasoline was used for fuel, \$2.09, \$1.85, and \$1.67. Horses were displaced on only about 57 per cent of the farms where tractors were used and where no increases were made in the farm acreage, and amounted to an average of slightly less than 4 horses displaced on each farm by the purchase of the tractor.

RURAL ECONOMICS

The Influence of Good Farm Organization in Costs of Production.—HANDSCHIN W. F., in *Journal of Farm Economics*, Vol. 1, No. 3, pp. 102-108. Lancaster, Pa., October, 1919.

Good organization in farming, as in any other business, has an important influence on costs of production and profits. While it is difficult to separate definitely the influence of good organization from the influence of good operations and other factors, it is nevertheless possible to show how good organization affects production and to measure with reasonable accuracy its influence on costs.

In attempting to determine the influence of good farm organization on production and costs, we can perhaps get a clearer idea of the problem if we study it from the standpoint of the three principal divisions into which farm organization somewhat logically divides itself; i.e., financial or economic organization, physical organization and productive organization.

The financial or economic organization of a farming business is concerned mainly with the problem of determining the minimum

size of business which is well adapted to the type of farming to be carried on, and to work out the most profitable distribution of the investment in various items such as land, buildings, machinery and tools, horses and other live stock.

It is evident that if production is to be carried on most effectively that the various items of investment must be utilized to the fullest extent consistent with the maximum returns for the farm business as a whole. Thus, if the farm is too small the amount invested in buildings, machinery and horses will be disproportionately high. Small buildings are relatively more expensive than larger ones per unit of space for housing live stock, storing feed, or sheltering machinery. A complete outfit of farm machinery needed for the successful operation of a farm in any given region will be adequate for a certain sized farm. This may range for ordinary types of farming from 100 to 200 acres. If the farm is not large enough to utilize fully a complete outfit of such machinery of standard size the costs for this item must be relatively higher than for those farms large enough to make a full use of the complete outfit of standard sized equipment.

In connection with the study of the best adjustment of buildings and machinery equipment, it is important to note that the carrying charge on these items is relatively high and it is therefore important to keep the investment as low as possible consistent with efficient operations. For example, the investment in farm buildings exclusive of the farmer's residence which is a personal item, often varies from \$10 to \$25 per acre for the same general types of farming carried on under very similar conditions. Apparently both of these classes of farmers have adequate buildings to furnish satisfactory shelter for stock, to store feed, and to house their machinery. If we assume a carrying charge of 15 per cent a year for interest, depreciation, upkeep, taxes and insurance, for the general run of farm buildings we should have the following results: For a farm with an investment of \$10 per acre the total carrying charge would be \$1.50 per acre per year. For a farm with an investment of \$25 per acre the carrying charge would be \$3.75 per acre per year. That is, we should have a difference in the carrying charge, or the cost of production per acre, due to this one item alone, of \$2.25 per acre per year.

In the case of machinery the carrying charge is still higher. If we include interest, shelter, taxes, upkeep and depreciation the carrying cost of farm machinery ranges from 25 to 35 per cent per year. Naturally upkeep and depreciation will be somewhat in proportion to the amount of use, but machinery wears out some "just by standing around," and also depreciates through obsolescence as well as use. Investments in farm machinery—exclusive of tractors—range from \$5 to \$10 per acre, throughout the corn belt section. If we assume a carrying charge of 20 per cent to

25 per cent, these differences in the investments in machinery per acre would mean a difference in the carrying charge, or the cost of production per acre, of from \$1 to \$1.25.

Cost accounting investigations in Illinois show that such differences in the cost of production due to differences in the investments in both buildings and machinery equipment actually occur on somewhat representative farms.

If we study the physical organization of the farm from the standpoint of its influence on production and costs, we find that it has an important bearing on the problem, particularly from the standpoint of economic operation. In working out the plan for the best physical organization of a farm, we find that the problem divides itself somewhat logically into two parts, *i.e.*, the organization of the farm as a whole, including the location of the farmstead and the general layout of the field system; and the more detailed planning of the farmstead including the location and arrangement of yards, paddocks, lanes and buildings.

In planning the organization of the farm as a whole the following are perhaps the chief considerations to be kept in mind. The farmstead should in general be so located as to reduce to the minimum the distance between the fields and the farmstead. This applies especially to those fields which are regularly brought into the rotation, and which therefore require the greatest expenditure of time travelling back and forth in raising crops, in hauling crops to the farmstead and in hauling the manure from the farmstead to the fields.

Naturally, the average distance to the fields will be determined to some extent by their general shape and arrangement. Ordinarily we should not like to locate the farmstead in the centre of the field system where this necessitates having it a long distance from the public road. A good general rule to follow would be to locate the farmstead on the public road as near the centre of the field system as possible. Small lots and minor rotation used for growing green forage crops, for hogs and sheep, *e.g.*, should be located near the farmstead to save time in caring for such stock.

In planning the field systems for the major rotation three principal aims are to be kept in mind. (1) There should be as many fields, of as nearly equal size as possible, as there are years in the rotation. (2) Fields should be as large as practicable. Large fields save time in doing farm work and reduce the cost of fencing. (3) Fields should be rectangular as possible, and should be about twice as long as they are wide as a general rule. This makes for convenience and economy in performing the various field operations. Rectangular fields are also more easily and economically fenced than irregular ones.

While many farms present difficulties in the physical organization of the field system

which cannot be overcome, one need only to study somewhat casually the organization of farms in going about the country to be convinced that the majority of such farms offer opportunity for improvement along this line. The University of Minnesota College of Agriculture reports that in the re-planning of a 160-acre farm, the average distance from the farmstead to the fields was reduced from 70 to 24 rods, and the amount of inside fencing required from 892 to 640 rods. Illustrations of this kind could be multiplied indefinitely.

We can only touch briefly on the question of the physical organization of the farmstead. This problem is relatively more important on farms producing live stock than on those devoted mainly to crop farming. The entire question of handling live stock with the minimum expenditure of man and horse labour presents opportunities for very important economies. All yards, paddocks, pastures and lanes should be so laid out as to make for the greatest convenience in moving animals from one place to another about the farmstead or between the farmstead and the farm fields.

The location and arrangement of barns, stables, feed storage and general feeding equipment should be so planned as to reduce the man and horse labour required to the minimum. While we have only begun to study these questions somewhat systematically, we already have numerous illustrations of very material labour economies which have been effected through good organization of the physical plant used in producing live stock. Other and more careful studies need still to be made, in order to give us more exact figures regarding the reduction in costs which can be effected in this direction.

Important as are the economies which can be effected through the best financial and physical organization of the farm, it is probable that on a large majority of farms even greater economies can be effected through the more scientific organization of their productive enterprises, *i.e.*, through their productive organizations.

In the organization of the crop and animal enterprises of the large majority of farms with a view to establishing the most profitable and permanent systems of farming, a number of complex and inter-related factors must be taken into consideration. Most important among these, regardless of the order of their importance, would perhaps be the following: The maintenance of the fertility of the soil; the most advantageous marketing of all crop material produced; the best utilization of the man and horse labour used; and the insurance against crop failures, price fluctuations, and other unfavourable conditions by means of a reasonable degree of diversity in producing both crops and animals.

In studying costs of production in agriculture the expense of soil replacement has been almost entirely overlooked. This has

been due largely to the fact that farming land has been constantly advancing in selling value, in spite of the fact that it has been almost everywhere gradually decreasing in productive energy. While it is evident from the economic standpoint that the agriculture of almost every new region must of necessity be extractive, it is equally evident that at some stage in the development of such new regions the point of diminishing returns must be reached. That is, sooner or later it will pay the operator of such lands better to begin improving or at least maintaining this fertility, rather than to go on farming them extractively. Just when this point is reached it is naturally difficult to tell. It is safe to assume, however, that a great many farmers do not make such changes in their systems of crop production and soil maintenance nearly so early as economic conditions warrant. It is evident both from the standpoint of sound accounting as well as a good farming procedure that the problem of soil replacement must now be taken into consideration in all of the older agricultural regions of the United States in attempting to determine costs of production and profits in farming.

In the working out of this problem several factors must be considered. First, that for general farming the growing of legume crops offers the most economic source of nitrogen, and that the rotation should include the proportion of legume crops necessary to maintain or increase the nitrogen in the soil. Second, that in systems of farming where the crops grown are fed to live stock, and the manure is carefully handled, from 60 to 70 per cent. of the nitrogen, from 75 to 80 per cent. of the phosphorus and from 80 to 85 per cent. of the potassium contained in the crops fed can be returned to the soil. And third, that insofar as the mineral elements in the soil are limiting crop production they should be added in such form and in such amounts as will contribute most to the profits of the entire farm business.

In organizing the productive enterprises of the farm so as to provide the most advantageous market for all of the crop material produced, live stock plays an important part. Regular markets frequently offer very little for damaged grains and other crops, even though they may have almost full feeding value as compared with crops of the best quality.

Much low grade and otherwise waste crop material can be converted into the best quality of live stock products. In fact, a considerable proportion of all crop material produced in a good system of farming has little or no market value. Such low grade and unsaleable products can, however, be converted into live stock products by feeding them in connection with the saleable crops grown, nearly all of which must in the end be fed to live stock to find a market. By keeping some live stock on all farms growing ordinary crops, it is possible to market

advantageously not only the saleable portion of the crops grown but also the unsaleable and waste portions.

This factor alone eliminates much waste and helps to increase profits without increasing the cost of producing animals and animal products.

In practically all types of ordinary farming man and horse labour make up from 75 per cent. to 85 per cent. of the total operating expenses. A good rotation of crops and the production of two or more kinds of live stock make possible the most even distribution of labour throughout the year. An even distribution of horse labour means that the horses carried can do more work during the year, or that a given amount of work can be performed by a smaller number of horses. Actual cost accounting results on Illinois farms show wide variations in the cost of horse labour. The variations found are frequently responsible for differences of from \$1 to \$4 per acre in the cost of producing ordinary crops, such as corn, oats, wheat and hay. In just how far these differences are due to good farm organization and in how far they are due to good farm operation and other factors it is important to be able to say with considerable exactness. It is plain, however, that they are due mainly to the more efficient organization of the productive enterprises, *i.e.*, the crop rotations and the systems of animal production followed.

The more even distribution of man labour throughout the year, as a result of the best organization of the crop and animal enterprises, makes it possible to find productive employment for practically all of the man labour required at the peak load period. This means that relatively little extra man labour need be hired when labour is scarcest and when wages are therefore highest. It also means that a better grade of man labour can be secured. The best farm labourers will not be contented with a job which does not provide employment throughout the entire year.

Most farmers are working on more or less limited capital. This makes it especially desirable that they organize their productive enterprises in such a way as to offer the largest measure of insurance against crop failure, price fluctuations and other unfavourable conditions. This can be done best by growing several crops well adapted to the region, and by marketing these crops through two or more classes of live stock. In most sections it is also desirable to have at least one cash crop. When several crops having somewhat different seasonal requirements are grown, there is little danger that all will be poor during any one year. When the crops grown are marketed through two or more classes of live stock, the farmer has more choice as to what class of stock he will use in marketing his feed. This is especially true when he does not overstock on animals and when he keeps his animal enterprises as flexible as possible. Such flexibility in the

live stock enterprise is secured mainly by carrying at least one class of animals which can be reduced or increased somewhat from one year to another without too serious disadvantages. Poultry, swine and sheep represent good illustrations of flexible animal enterprises. Horses, dairy cows and beef cows represent the more inflexible forms of animal production. The more flexible or adaptable the system of crops and animal production, the greater measure of insurance will the farmer have against poor crops, violent fluctuations in prices and other unavoidable conditions.

Efficient farming consists mainly in so adjusting the financial, physical and productive organization of the farm as to return the maximum profits for the entire business over a series of years. Each enterprise must be studied from the standpoint of its influence on the business as a whole.

AGRICULTURAL INDUSTRIES.

Flax Growing in Russia.—*The Russian Co-operator*—Vol. 3, Nos. 11 and 12. London, England, November and December, 1919.

Russia is a country of small peasant holdings, the household of the peasant family carrying on its husbandry exclusively with the work of its own members, without resorting to hired help.

Owing to the different conditions of climate and soil prevailing in various parts of Russia, the nature and structure of the peasant husbandries are not uniform all over the country. In the north and northwest of European Russia the main basis of the husbandries is formed by buttermaking and flax growing. As far as the latter is concerned, it forms the principal occupation of the peasants in over one-third of all the provinces of Russia. Before the war, the area under flax in 27 provinces exceeded 2,780,000 acres, there being over 3,500,000 peasant households engaged in the cultivation of flax.

In some parts of Russia the acreage under flax approximated from 25 to 30 per cent of the whole area under crops. In such localities, the return from flax growing formed a considerable part, extending to 50 per cent and over of the whole revenue of the household.

Russia occupies a prominent position in the world production of flax, as is evident from the fact that out of 15,298,000 acres, representing the average yearly world acreage under flax in the last decade before the war, 2,786,000 acres, or about one-fifth of the whole, were situated in Russia. As far as the products of flax growing are concerned, Russia occupies a somewhat peculiar position. Her share is a very small one in the world production of linseed, but she predominates in the production of flax fibre. This is illustrated by the following statistical data referring to the same period:—

Out of the total quantity of linseed, amounting to 6,331,000,000 lbs., produced all

over the world, Russia's share was limited to 891,000,000 lbs., or to 14 per cent of the whole; whereas, from the total world production of flax fibre of 1,482,000,000 lbs., Russia supplied 925,000,000 lbs., or 62.3 per cent.

The part played by Russia in the world's supply of flax fibre appears still more clearly when compared with data referring to some of the principal flax growing countries of Europe. The average figures for the years 1903-1914 are given in the following table:

Countries.	Area under Flax.		Total Yield of Flax.		Average yield per Acre.
	Acres.	%	Tons.	%	Lbs.
Holland.....	34,560	1.1	8,361.4	1.7	543
Hungary.....	46,440	1.5	12,704.8	2.6	613
Ireland.....	48,600	1.5	9,667.8	2.0	445
Belgium.....	49,140	1.6	9,833.9	2.1	448
Germany.....	57,570	1.9	10,477.4	2.2	408
France.....	61,290	2.0	20,869.3	4.3	761
Austria.....	149,850	4.8	44,325.8	9.2	661
Total for all countries except Russia.....	447,450	14.4	116,250.4	24.1	554
Russia.....	2,676,810	85.6	363,659.7	75.9	308

The data of the table show that, notwithstanding the low productivity of flax growing in Russia, being one-half what it is in Hungary and Austria, and $2\frac{1}{2}$ times lower than in France, Russia nevertheless occupies the first and foremost place in the world production of flax fibre. She grows flax over an area six times larger than all the other European countries combined, and gathers, as compared with them, three times as much flax.

The Sun Drying of Vegetables.—HOWARD, G. L. C., in *Fruit Experiment Station, Quetta, India, Bulletin No. 8*, pp. 20, 1918.

This bulletin, which presents the results of an investigation of methods for the sun drying of vegetables in the arid climate of Quetta, India, contains information of general interest in connection with the dehydration of vegetables. The main principles of successful drying, are considered to be rapidity of drying and treatment of the fresh material by some form of heat, upon which depends the toughness or tenderness of the resulting product.

General directions are given for the preparation of the material, for the heating processes of steeping, scalding, or steaming, for drying, and for storage and transportation of the dried product. Compression of the dried vegetables into bricks is recommended in the case of the more bulky vegetables, and a simple hand press for the purpose is described and illustrated.

Special directions are given for the drying of French beans, cabbage, egg-plant, carrots, peas, kohl-rabbi, onions, potatoes, spinach, tomatoes, turnips, and several native vegetables. General and special directions are included for cooking the dried products. It is emphasized that all the vegetables, even those which are ordinarily fried, must be boiled after soaking.

1257—Commercial Preservation of Eggs By Cold Storage.—JENKINS, M. R., in *United States Department of Agriculture, Bulletin 775*, pp. 35. Washington, D.C.

This contribution from the Bureau of Chemistry is based upon the systematic examination of 841 30-doz. cases of eggs of varying grades (April, May, June, and July firsts, June and July seconds, and dirty eggs of April to July) shipped from the Middle West to New York and Philadelphia, and held for various periods at 30 to 33°F. in rooms used commercially for the cold storage of eggs in the shell. The purpose was to investigate the conditions influencing the efficiency of the cold-storage method of preserving eggs.

The commercial selection by inspection and clicking of clean eggs with sound shells from current receipts was found to be inefficient. Commercial packages of spring firsts when ready to be taken to the storage rooms showed an average of 17.5 cracked eggs and one leaking egg to the case. Candling was much more accurate since the eggs could be graded according to quality, and cracked and bad eggs could generally be detected. Cases of spring firsts graded by candling did not average more than 3 cracked eggs per case when ready for storage. Spring eggs prepared for storage by commercial sorting showed, after 7 to 11 months' storage, an average total loss of 18.5 bad eggs per case, 9 of which were due to direct spoilage of damaged eggs or to their contamination of neighbouring eggs by molding. Corresponding cases of eggs graded for storage by candling showed, after a similar period of storage, 7 bad eggs per case.

The rate of evaporation of moisture from eggs was very uniform during the storage period, and averaged from 3 to 4 oz. per case per month in the different storage rooms under observation. The moisture is condensed on the brine pipes, and absorbed by the air, case, and fillers, most of the absorption of moisture by the egg package occurring during the first few months in storage. The gain in weight of individual cases with the accompanying cushions, fillers, and flats varied from 11.5 to 14 oz. during the average storage period of 10.8 months.

Eggs that were fresh when stored showed after storing an increased air space and often a tinge of yellow in the white. The yolk membrane was slightly weakened, but commercial separation into white and yolk was readily accomplished even after 11 months' storage. The percentage of ammoniacal nitrogen in eggs increased during storage, the rise being more rapid during the early part of the storage period. The amount of ammoniacal nitrogen in eggs is considered a good index of chemical deterioration.

Evidence is produced to show that the "cold-storage taste", which usually develops after 7 or more months' storage, is due mainly

to absorption of odors of the strawboard fillers in which the eggs are packed.

Imperfections in commercial handling, grading, and marketing previous to storage are mainly responsible for the bad eggs developing in commercial eggs during storage. The preservation in the shell of undergrade eggs, such as dirty, cracked, leaking, heated, and stale eggs, should not be attempted. If not marketed for prompt consumption, the contents should be removed under proper conditions and frozen. The frozen product will keep for a year or more, whereas there would be a marked deterioration in quality of the eggs were stored in the shell.

AGRICULTURAL ECONOMICS

CO-OPERATIVE AGRICULTURAL CREDIT IN SWITZERLAND

In Switzerland, as in most other countries, agricultural credit business is conducted in the co-operative form. For this purpose single rural banks were founded on the well known principles of F. W. Raiffeisen, and they gradually spread to all the cantons and enlarged their sphere until they felt the need to group themselves in a special union which would co-ordinate and give an impulse to their work.

The Rural Banks.—The development of co-operative credit in Switzerland dates from 1900, when the first rural bank was founded in Bichelse (Thurgovia). This example was soon followed in all the Swiss cantons. The Swiss rural banks are of the pure Raiffeisen type, having mutual and unlimited liability. They are entered in the trade register, discharge the duties of savings and credit banks, and are regulated by Articles 678 to 715 of the federal code on obligations.

A banking society may trade in primary materials, agricultural produce and articles of consumption required by industry and agriculture, within the limits of the capital it commands. Members pay into the bank, when admitted to membership, an entrance fee which becomes the property of the association, and also the amount of a share which entitles them to participation in the bank's affairs. The agents of the association are its managing committee, its cashier, its board of directors and its general meeting. The chairman of the managing committee and the chairman of the board of directors are elected by the general meeting. The members of these two bodies are honorary, unpaid officials, holding office for four years.

The capital at the society's disposal for its business is formed of the society's capital, entrance fees, the reserve fund, and capital deposited in the bank (members' shares, loans, savings deposits). The reserve fund is made up of 50 per cent. deducted from annual profits as a first charge. From the remaining 50 per cent. the general meeting deducts the sum necessary for payment of

interest on members' shares, at a rate not exceeding that at which the bank pays interest on loans. The residue goes to the reserve fund. When the reserve fund becomes equal in amount to the capital formed by the members' shares, the annual net profits, after deduction of interest on the shares, is assigned by the general meeting to agricultural and industrial enterprise advantageous to the whole body of the members. In all cases the reserve fund remains the property of the society. The members have no individual right to it and cannot demand its division among themselves. The Raiffeisen Banks belong to the Swiss Union of Raiffeisen Banks and must undergo periodic inspection on the part of an inspector of that body. In case of dissolution, the funds are transmitted to the Union or to some other safe institution, and there remain at interest until a new society, based on identical principles and imposing by its rules the same conditions of admission as the Swiss Union (Article 4 of the central rules) is constituted in the same district.

Generally speaking, it may be stated that the Swiss rural banks show for 1917, as compared with previous years, very promising results. The total balance of all the banks passed from 37,909,412 francs in 1916 to 46,552,374 francs in 1917, thus increasing by about 25 per cent. The total incomes and outgoings showed proportionately an even greater increase between these two years, namely one of about 38 per cent. which brought their sum up to 145,486,946 francs.

The Swiss Union of Raiffeisen Banks.—On June 12, 1902, the Swiss Rural Banks, taking for basis Article 678 and the following articles of the Federal Code as to obligations, founded for an undetermined period of time a limited liability association having the following programme:—(a) the foundation and development on the Raiffeisen system of lending banks and co-operative societies of public utility; (b) the giving of advice and

information to members of the Union as to their business, and (c) the defence of their interests of all kinds, particularly in connection with public authorities and legislative organs. It devolves on the (Union) (a) to see that the federated banks accurately fulfill the duty of keeping their books on a uniform system, such books being periodically inspected by auditors appointed *ad hoc*; (b) to institute a Central Bank managed on commercial lines and intended to establish a balance between the need for money and the available resources of the federated banks; (c) to purchase and sell collectively agricultural or manufactured products.

The Union's foundation capital is made up of the partnership-conferring shares of the affiliated societies. These shares are security for the valid debts which the Union contracts, as is the remainder of the capital. Such security holds good for two years after the status of membership has been lost. Members are obliged to take one partnership-conferring share of 1000 francs for every hundred or fraction of a hundred members, and to pay the amount into the central fund by annual instalments of 200 francs.

As regards admission to the Union, the general principal holds good that only mutual credit associations, whose rules do not transgress any of the essential rules laid down by the Union's model rules, may belong to it. The federated societies have the right of depositing their valuable capital in the Union's bank, of contracting loans with this bank, of participating in the trade in goods, of obtaining advice and information as to their business from the Union's committee, and of delegating one representative, having one vote, for every hundred or fraction of a hundred members they include, that is to say of having as many representatives as they have partnership-conferring shares. The Swiss Union of Raiffeisen Banks has the following administrative agents; the committee, the board of directors, the cashier, the auditors, the delegates' meeting. The committee and the board of directors are elected by secret ballot by the delegates' meeting; the cashier and the auditors are appointed by the committee.

It has already been stated that one of the Union's chief duties is the institution of a Central Bank intended to maintain a balance between the federated banks' need for money and their available resources. The bank in question is managed by the Union's cashier, supervised by the union's administrative agents, and in the first place by the committee. The cashier, his clerks and the auditors are officials of the Union, freely appointed by its committee.

The capital necessary to the working of the Central Bank is made up: (1) of the partnership-conferring shares; (2) of profits realized on goods; (3) of the deposits of the federated banks; (4) by the Union's savings-bank; (5) by the issue of bonds and current credit accounts; and (6) by the constitution

of mortgages on the sale of chattels or real estate.

The Central Bank grants loans only to the federated societies and in proportion to their credit, after an investigation by the committee. Superfluous funds are deposited in very safe financial institutions, or are invested in safe securities, or assigned to the purchase of real estate. No dividends are paid. The partnership-conferring shares bear interest at a rate fixed by the general meeting in accordance with the results obtained in the previous year, such rate in no case exceeding 5 per cent. Net profits are paid into the reserve fund until its amount is equal to ten times that of the partnership-conferring shares, and are afterwards invested at interest by the Union or its sections in accordance with the resolutions of the General Meeting.

The formation within the Swiss Union of Raiffeisen Banks of *sectional groups*, extending over one or more cantons has been authorized. These groups may have the same aims as the Union, but may not institute a central bank and their rules may not in any particular conflict with those of the Union. Societies which do not belong to the Union may be admitted to these groups. In case of dissolution, the association's capital is, after liquidation, invested at interest and its real estate is sold. This property becomes that of a new union which must be constituted by a majority of the federated societies or by the representatives of these at the time of dissolution. If such a new union has not been constituted within three years of the dissolution, the aforesaid societies or their representatives will dispose of the associations' capital as the majority of their votes decide, but may not share it among themselves.

A detailed account of the activity of the Central Bank is given in the article in the Institute Bulletin.

THE WORKING OF THE UNITED STATES FEDERAL FARM LOAN SYSTEM

The Federal Farm Loan Act of 1916 was explained in the "Bulletin of Foreign Agricultural Intelligence" for September, 1916, page 714, and in the "Agricultural Gazette" for April 1918 some data were given as to the first year of the working of the Act. It is now possible to review more completely the establishment of the Federal Farm Loan System and the results to which it has attained. The system is without precedent in American economic history and has therefore the interest of an experiment.

The Organization of the Land Banks and Farm Loan Association.—It will be remembered that the Federal Land Banks which were set up in each of twelve Land Banks Districts were intended to form merely the superstructure of the new organization and to come into touch with the farmer through National Farm Loan Associations. There-

was however a provision in the Act that if within one year of its passage no such association had been or was likely to be formed in a given locality, the Federal Farm Loan Board might appoint as its agents banks, trust companies, mortgage companies or savings institutions incorporated under State laws, through the medium of which a Land Bank could make long-term loans subject to the same conditions as the loans made through the associations.

The lending activities of the Federal Land Banks necessarily waited upon the formation of National Farm Loan Associations, which was impeded both by the usual individualism of farmers and by technical difficulties due to the unprecedented nature of the whole scheme. It was sought to overcome the first of these obstacles by means of a campaign of education, conducted through the newspapers, popular magazines, the Department of Agriculture and the publications of the Farm Loan Bureau.

The technical difficulties arose partly out of the indefiniteness of certain provisions of the Act. The Farm Loan Board had to settle the most desirable size of an association, the amount of the loans, the extent of territory it should cover, the pay to be received by the secretary-treasurer and members of a local loan committee, the charges for appraisal and determination of title. There were also questions as to what borrowers were eligible, the purposes for which loans might be made, the kind of land which might be accepted as security, and the valuation which should be placed upon certain kinds of land. Rulings of the Board

were that a farmer, able to borrow by means of the new system, is the man who conducts a farm and directs its entire system, with or without hired help, and that he "need not necessarily reside upon the farm mortgaged"; that "equipment," a purpose for which loans are authorized, includes "improvements needed in the conduct of a farm to facilitate its operations," and also "teams as well as machinery, tools, and the like"; that "improvements" include "anything in the form of a beneficial structure"; and that it is unnecessary for borrowers to cultivate all the land mortgaged.

Another important question which had to be decided before Farm Loan Associations could become active was whether the laws of particular States as to foreclosure, homestead exemption, the conveying and recording of titles to land and kindred points were such as to afford sufficient protection to the holders of first mortgages. The laws of Louisiana and Texas were found to be not wholly satisfactory in this respect. In Louisiana the Board sanctioned loans only after the State law had been amended by a special session of the legislature. In Texas a law exempting homesteads from execution and mortgage was not regarded with favour, but loans were not entirely refused, and a fairly large number of them were made.

The following table shows the number of Farm Loan Associations which have been formed and the business they have done from the time the first of them received a charter on March 27, 1917, until November 1st, 1918.

THE FARM LOAN ASSOCIATIONS.

March 27, 1917—November 1, 1918.

District.	Number of Ass'ns November 30, 1917.	Loans Closed to November 30, 1917.	Number of Ass'ns November 1, 1918.	Total Loans from time of Organization to November 1, 1918.		
				Applied for ¹	Approved.	Closed.
		\$		\$	\$	\$
1. Springfield.....	55	708,455	111	9,593,194	7,111,195	5,482,875
2. Baltimore.....	77	1,599,900	128	9,545,672	7,591,865	5,441,950
3. Columbia.....	157	918,345	318	22,254,446	11,553,654	6,932,820
4. Louisville.....	194	1,782,300	265	19,713,829	13,962,100	8,897,900
5. New Orleans.....	168	1,634,335	304	23,032,448	14,312,925	10,043,615
6. St. Louis.....	140	1,254,470	319	15,879,095	12,947,840	9,455,077
7. St. Paul.....	126	4,418,100	416	33,163,700	22,950,350	19,773,300
8. Omaha.....	79	1,787,490	265	25,197,870	20,767,740	15,642,740
9. Wichita.....	344	7,390,900	381	21,644,651	17,349,500	15,017,600
10. Houston.....	153	1,145,345	275	26,718,019	26,366,135	12,528,379
11. Berkeley.....	87	1,818,400	154	13,401,306	10,558,000	8,502,000
12. Spokane.....	259	5,366,615	421	45,251,882	29,225,000	21,659,900
Total.....	1,839	29,824,655	3,358	265,396,112	194,696,424	139,378,156

¹ Does not include cancelled and rejected applications.

In view of the difficulties which attended the formation of National Farm Loan Associations, the progress made has been remarkable. In October, 1918, loans amounting to \$7,580,736 were made to 3,075 farmers and these monthly figures are approximately typical. The total amount lent is indeed

not great as compared with the total mortgage indebtedness of the United States; but it should be remembered that the work of organizing Farm Loan Associations has only begun and that the membership of those in existence may be expected to increase.

It is thought that the Act provided too

many Land Bank Districts; in two cases it seems that the banks will have to continue to use government capital, and in these and two others the amount of the loans applied for has been small. It has become clear that the greatest demand for loans comes from the West and South, the comparatively new farming districts, where high rates of interest have obtained. The St. Paul and Spokane districts, which embrace the Northwestern States, lead all others as regards both the number of associations and the amount of the loans for which application has been made. Excluding Texas, which is a district by itself, more associations have been formed in North Dakota than in any other State, and Washington is a close second. In District 6—Illinois, Missouri, and Arkansas—the demand for loans and the number of associations are greater, because the rate of interest is higher, in Arkansas than in Missouri or Illinois. The farmers of the West are not co-operators by taste and have in the past preferred to deal with institutions conducted for profit; but since little advantage has been taken of the clause in the Act which allows the appointment of agents, they have found themselves obliged either to form associations or to pay unnecessarily high interest on the sums they borrow. The failure to appoint agents is due to defects in the clause regarding them, which render its operation impractical.

The Financing of the Land Banks.—In providing the machinery for keeping the banks supplied with a continuous flow of lendable funds, the Act assumed that as a bank invested its capital in mortgage loans it would pledge the mortgages as security for a bond issue and sell the bonds. This process involved, however, the locking-up of a large portion of the bank's capital in farm loans at a time when mortgages were not yet available for bond issues, and the possibility that all the original capital of some banks might be exhausted before the bonds were issued. There was also a danger that these bonds, which constituted security of a type new in America, might not attract conservative investors.

The Farm Loan Board therefore arranged with a syndicate of bond houses that they would associate themselves with bond dealers in every Federal Land Bank District, purchase 40 per cent of the bonds issued under the first agreement, and retail them at 101½. The rate of interest borne by the bonds was 4½ per cent. They were drawn for a term of twenty years and might be called after the expiry of the first five. Under this agreement the syndicate bought about \$25,000,000 of the bonds.

Since the rate of interest on Federal Farm Loan Bonds was 4½ per cent it was necessary that the Land Banks should lend at not less than 5 or more than 5½ per cent. Although it was known that, even if loans were made at the maximum rate, the full margin of 1 per cent would not allow the Land Banks

to meet their expenses in the first year, the borrower's rate was fixed at 5 per cent. At the same time the Board strongly advised that farmers should take their loans on mortgages for a period of thirty-six years. For at the outset it was expedient to fix a low rate of interest and keep the yearly charge of amortization low, in order to attract a sufficient number of borrowers. The short-term bonds were preferred as being in view of the novel character of the investment, more attractive to investors. They might be converted into 4 or 3½ per cent bonds if they were called in before maturity; or if a large number of them were allowed to mature the unpaid portion of their principal at the end of twenty years would be available as security for new bonds, bearing a lower rate of interest, from the proceeds of which all obligations would be promptly met.

The entrance of the United States into the European War greatly affected the Board's policy. Between the issue of the first and the second Liberty Loans no difficulty was experienced in marketing nearly \$30,000,000 of farm loan bonds at a premium. But the absorption by the government of nearly six thousand million dollars of capital within six months and the rapid rise in rates of interest made it clear that even if the premium on Farm Loan Bonds were reduced they could not be marketed in the amount or with the promptness required. Not only had the normal need for farm loans to be supplied, but there was a stimulated demand due to war prices and to the fact that farmers were being urged to make their land more productive.

The Farm Loan Board raised the rate of interest on mortgages to 5½ per cent as from December 6, 1917. Then, on January 18, 1918, it obtained from Congress an amendment of the law which authorized the Secretary of the Treasury to purchase Farm Loan Bonds at par and accrued interest to an amount not exceeding \$100,000,000 in the fiscal years ending on June 30, 1918, and June 30, 1919, these bonds to be subject to redemption or sale by the Land Banks at the same price. Thus the land banks were enabled to continue to grant loans to an essential war industry without interfering with the sale of Liberty Bonds. In May 1918, the rate of interest on Farm Loan Bonds was increased to 5 per cent. On December 1, 1918, the total amount of the outstanding Federal Farm Loan Bonds was \$140,500,000.

The original Act provided that as soon as the subscriptions of National Farm Loan Associations to the stock of any Land Bank had reached the sum of \$100,000 that is when a Land Bank had made loans to the amount of \$2,000,000, the number of Land Bank directors would be increased from five to nine, of whom six would be representatives of the National Farm Loan Associations. It also provided that a Land Bank should, after \$750,000 of its stock had been sub-

scribed by a Farm Loan Association, begin to retire the shares subscribed by the government and the public by applying, twice a year, 25 per cent of all sums thereafter subscribed to the retirement of the original stock. In accordance with this latter provision two banks, those of Spokane and St. Paul, retired government stock in November 1918 and two others, those of Omaha and Wichita, were expected to do so in May, 1919. Nevertheless none of the Land Banks has been organized on a permanent basis. The Farm Loan Board judged that the Government should continue to nominate a majority of the Land Bank directors while it remained the largest stockholder, and a provision to this effect was included in the amendment of January, 18, 1919.

Thus far none of the Land Banks has paid dividends, although the four named in the last paragraph are accumulating surpluses and hope soon to do so. The business of the other banks has been too small to make up for the initial drain on their capital. They have been obliged to wait upon the formation of Farm Loan Associations, and their customers have included many borrowers of small sums whose titles have been as expensive to determine as though they had taken large loans. With a view to increasing the net earning powers of the less prosperous banks, the Board has suggested to Congress that the maximum loan authorized by the Act be increased from \$10,000 to \$25,000.

The Joint Stock Land Banks in the New System.—In the article in the "Bulletin of Foreign Agricultural Intelligence," Sept. 1916, we explained the terms on which Joint Stock Land Banks could make farm loans secured by mortgages, under the Act.

No Joint Stock Land Bank was brought under the Act for nearly a year after its passage. Certain "rural credit associations" were indeed formed in the South and West and it was represented that they would eventually receive federal charters. But some of them were clearly fraudulent, and for the protection of the stockholders the Board intervened with a ruling that no charter would be granted to any Joint Stock Land Bank if its promotion had involved expense.

Almost as soon as the Federal Land Banks were ready to begin business a few Joint Stock Land Banks were organized. But their progress was slow. On November 1, 1918, only nine of these banks had been organized, and five of them had issued bonds aggregating \$6,875,000. The rate of interest on the bonds was $4\frac{1}{2}$ per cent in one case, 5 per cent in the others. One of the banks had a capital of \$1,125,000, another a capital of \$375,000, each of the seven others a capital of \$250,000. Only four of these banks were engaged in the business of negotiating farm mortgages before they were organized as federal corporations, and two were operated by the same group of mortgage bankers. Manifestly farm mortgage companies have

been reluctant to change their form of organization and their methods, or to incur the restrictions imposed by the new system. They have already perfected an organization in a carefully selected territory, extending over several States, in which they have the goodwill of a large and dependable clientele, and can conduct a large and fairly profitable business with a very small amount of capital. They have been little affected by the Federal Land Banks, which are chiefly active in the new agricultural districts while their business is mainly confined to the districts which are most developed agriculturally. Where they compete with the Federal Land Banks the lower rate of interest on loans charged by these latter is out-balanced by the fact that the farmer who borrows from a mortgage company knows the approximate cost of his loan from the first and can repay the principal in whole or part before the expiry of five years, and that his loan is closed very soon after he has applied for it.

The bankers lending on farm mortgages have however been aroused by the steady growth in the number of Farm Loan Associations. They have formulated, in a series of conferences held between October 1917 and January 1918, certain amendments which would enable them to enter the new system and compete with the Federal Land Banks on more advantageous terms. They ask that a Joint Stock Land Bank be allowed:

- (1) to make mortgage loans in all parts of the continental United States;
- (2) to issue farm loan bonds up to twenty (instead of fifteen, as at present) times the amount of its capital and surplus;
- (3) to make loans at a maximum rate of $6\frac{1}{2}$ per cent;
- (4) to sell mortgages without recourse when these are not to be security for bond issues;
- (5) to make short-term loans and single payment loans or loans payable in instalments;
- (6) to invest a portion of its funds in municipal bonds and other securities to be approved by the Board;
- (7) to substitute in the corporate name the word "national" for the words "joint stock" which are not well understood in America;
- (8) to go into voluntary liquidation.

It also proposed that the provisions of the law relating to Joint Stock Land Banks be brought together into one complete section, entirely independent of the sections pertaining to Federal Land Banks.

If these amendments are approved, it is not unlikely that Joint Stock Land Banks would conduct most of the farm mortgage business of the Middle West.

Conclusions.—The purpose of the Federal Farm Loan Act was in the first place to improve the method of making loans, secondly to bring the cost of borrowing on farm mortgages to approximate equality throughout the United States.

The working of the system has proved the advantages of long-term loans repayable by amortization and the advantages of mobilizing capital by selling bonds issued on

the collective security of farm mortgages. Capital has been brought from investing centres to farms. In the old agricultural States no great economy has been effected, but in districts where the rate of interest on loans used to vary from 8 to 10 per cent, the cost of borrowing has been sensibly reduced

and the demand for loans much stimulated.

The Federal Land Banks have done most business in the States which previously were not attractive to private capital, as appears from the following figures which show the position on November 1st, 1918:

	Percentage of Total Federation Farm Loans.	Percentage of Total Mortgage Debt of Country.
Southern States (including Southern Atlantic Division).....	32.5	16.1
Mountain States.....	12.7	2.8
Pacific Coast Division.....	12.7	5.6
West North Central States.....	29.05	38.2
East North Central States.....	8.4	26.2
New England and Middle Atlantic Divisions.....	4.5	10.9

The usefulness of the Farm Loan Association as a principal source of credit under the new system is questioned. Even if dividends were paid on the stock of the Federal Land Banks it is not likely that the borrower would receive dividends on the stock of his association and at the same time be exempt from the payment of assessments. The borrower is indeed relieved from the necessity of paying commissions in advance, but, on the other hand, he is obliged to subscribe for stock out of his loan without immediate prospect of the repayment of his subscription, a charge equal to a flat commission of 5 per cent, payable in advance. There is necessarily a long interval between the application for and the conclusion of a loan. The association has to be organized; current business has to be transacted; the loan has to be closed by a complex operation perplexing to those not accustomed to credit business. While some associations pay officials they do not give salaries sufficient to secure the accuracy and despatch which often distinguish the business of private firms. Finally, there is a tendency among the members of Farm Loan Associations to lose interest in their association when once they have secured their own loans.

Mr. George E. Putnam of Washington University, the chief authority for the foregoing remarks, stated "that it is still too early to pronounce the Federal Loan System

either a success or a failure. In the light of its slow progress and meagre accomplishments, one would hesitate to call it a distinct success. But its record thus far cannot be made the basis for estimating its future worth. The system is still in the organization stage. If it proves to be unsuccessful, it is not likely to be abandoned but rather to be modified to suit American needs. For the time being, however, it is certain that a much greater measure of success could be assured if co-operation were made entirely voluntary and borrowers were permitted to resort to the method of individual contract in obtaining loans. With most of them the individualistic instinct is deep rooted, and it will require something more than mere legislation to make them co-operative at heart."

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In addition to those already dealt with herein, the following is a list of the more important subjects treated in the August-September-October number of the International Review of Agricultural Economics. Persons interested in any of the articles in this list may obtain the original bulletin on application to the Institute Branch, so long as the supply for distribution is not exhausted.

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AGRICULTURAL STATISTICS

THE WORLD'S FOOD, FEED, AND LIVE STOCK SITUATION

BY T. K. DOHERTY, LL.B.

What is the food and feed situation of the world in 1919 as compared with that of the previous year and as compared with the five years' average immediately preceding the war? The accompanying tables set forth that situation in detail. In order to more closely grasp the significance of these tables, they will be followed by an analysis and a brief summary statement.

Wheat is the product on which the largest number of countries furnish official reports. Data on the other products and on live stock

are confined comparatively to a few. Only scattered data have been secured since the war from such countries as Germany, Austria, Hungary, Bulgaria, Serbia, Roumania, Russia, and the new countries which have resulted from the disintegration of others. The statement following this article, entitled "Foreign Crop Conditions" gives the latest reports concerning conditions in different countries including the countries just mentioned.

WORLD'S PRODUCTION OF WHEAT.

Table A.

Countries.	1919.	1918.	Five year's average 1909-1913.
	Bushels.	Bushels.	Bushels.
NORTH AMERICA—			
Canada.....	193,260,000	189,075,000	197,118,000
United States.....	940,987,000	921,438,000	686,697,000
Mexico.....	10,000,000 (a)	8,000,000	8,000,000
Total North America.....	1,144,247,000	1,118,513,000	891,815,000
SOUTH AMERICA—			
Argentina.....	170,000,000 (a)	184,270,000	148,908,000
Chili.....	12,000,000 (a)	12,000,000	14,000,000
Uruguay.....	7,000,000 (a)	8,000,000	6,519,000
Total South America.....	189,000,000	204,270,000	169,427,000
AUSTRALASIA—			
Australia.....	44,000,000 (b)	80,836,000	90,500,000
New Zealand.....	6,000,000 (a)	6,265,000	7,070,000
Total Australasia.....	50,000,000	87,101,000	97,570,000
AFRICA—			
Algeria.....	25,560,000	49,237,000	34,998,000
Egypt.....	38,000,000	32,555,000	34,121,000
Tunis.....	7,349,000	11,942,000	6,230,000
South Africa.....	6,303,000	8,600,000	6,520,000
Total Africa.....	67,212,000	102,334,000	81,869,000
ASIA—			
India.....	280,074,000	370,421,000	359,035,000
Japan.....	29,817,000	31,016,000	24,166,000
Korea.....	7,144,000	6,655,000	5,922,000 (c)
Persia.....	13,000,000 (a)	13,600,000	13,600,000
Russia-in-Asia.....	110,000,000 (a)	90,000,000	151,142,000
Total Asia.....	440,035,000	511,692,000	553,865,000
EUROPE—			
Great Britain and Ireland.....	71,000,000	93,146,000	59,640,000
Norway.....	800,000 (a)	1,087,000	306,000
Sweden.....	8,000,000 (a)	9,003,000	8,103,000
Denmark.....	5,916,000	6,331,000	5,344,000
Netherlands.....	6,015,000	5,345,000	4,896,000
Belgium.....	9,895,000	9,000,000	14,894,000
France.....	177,980,000	225,738,000	317,639,000
Spain.....	136,443,000	135,710,000	130,447,000
Portugal.....	6,400,000 (a)	7,000,000	7,440,000
Italy.....	169,565,000	183,296,000	183,336,000
Greece.....	4,000,000 (a)	8,000,000	4,320,000
Switzerland.....	3,524,000	7,095,000	3,314,000
Total Europe.....	599,538,000	690,751,000	739,679,000
GRAND TOTALS.....	2,490,032,000	2,714,661,000	2,534,225,000

(a) Estimates based on condition reports.

(b) From Broomhall's "Corn Trade News."

(c) Average 1913-1917.

RYE.

Table B.

Countries.	1919.	1918.	Pre-war Five years' Average 1909-1913.
	Bushels.	Bushels.	Bushels.
Denmark.....	14,921,000	12,728,000	17,700,000
Spain.....	27,038,000	30,445,000	27,600,000
France.....	27,833,000	28,935,000	49,200,000
Italy.....	4,571,000	5,232,000	5,500,000
Netherlands.....	14,057,000	12,827,000	16,100,000
Switzerland.....	1,575,000	1,850,000	2,000,000
Canada.....	10,207,000	8,504,000	2,400,000
United States.....	88,478,000	91,041,000	35,000,000
Totals.....	188,680,000	191,562,000	155,500,000

BARLEY.

Table C.

Countries.	1919.	1918.	Pre-war Five years' Average 1909-1913.
	Bushels.	Bushels.	Bushels.
Denmark.....	24,526,000	21,467,000	24,800,000
Spain.....	89,011,000	90,497,000	74,400,000
France.....	23,626,000	27,475,000	48,200,000
England and Wales.....	45,633,000	50,668,000	
Scotland.....	6,367,000	5,641,000	57,800,000
Italy.....	8,327,000	9,687,000	10,100,000
Netherlands.....	2,688,000	2,627,000	3,200,000
Switzerland.....	625,000	670,000	500,000
Canada.....	56,389,000	77,287,000	42,700,000
United States.....	165,719,000	256,225,000	181,900,000
Japan.....	91,482,000	89,249,000	97,800,000
Korea.....	26,480,000	27,751,000	24,000,000
Algeria.....	33,668,000	58,422,000	45,500,000
Tunis.....	5,971,000	13,090,000	7,800,000
Totals.....	580,512,000	730,756,000	618,700,000

OATS

Table D.

Countries.	1919.	1918.	Pre-war Five years' Average 1909-1913.
	Bushels.	Bushels.	Bushels.
Denmark.....	44,741,000	39,126,000	50,600,000
Spain.....	27,466,000	28,641,000	27,200,000
France.....	158,404,000	166,123,000	333,900,000
England and Wales.....	104,456,000	131,582,000	133,100,000
Scotland.....	48,681,000	59,252,000	
Italy.....	32,680,000	42,685,000	35,000,000
Netherlands.....	19,305,000	19,569,000	18,200,000
Switzerland.....	2,607,000	4,843,000	4,600,000
Canada.....	394,387,000	426,313,000	326,200,000
United States.....	1,248,310,000	1,538,124,000	1,064,700,000
Japan.....	9,339,000	6,426,000	4,500,000
Algeria.....	10,559,000	20,295,000	13,000,000
Tunis.....	3,242,000	4,020,000	3,200,000
Totals.....	2,104,177,000	2,486,999,000	2,014,200,000

CORN.

Table E.

Countries	1919.	1918.	Pre-war Five years' Average 1909-1913.
	Bushels.	Bushels.	Bushels.
Spain.....	24,554,000	24,142,000	26,400,000
Italy.....	78,736,000	76,591,000	100,400,000
Roumania (excluding Bessarabia).....	101,386,000	25,069,000	107,375,000
Switzerland.....	287,000	358,000	113,000
Canada.....	16,941,000	14,205,000	16,900,000
United States.....	2,917,450,000	2,502,665,000	2,708,100,000
Totals.....	3,139,354,000	2,643,030,000	2,959,288,000

POTATOES.

Table F.

Countries.	1919.	1918.	Pre-war Five years' Average 1909-1913.
	Bushels.	Bushels.	Bushels.
Spain.....	102,419,000	95,563,000	
England and Wales.....	101,995,000	157,136,000	134,600,000
Scotland.....	31,061,000	42,971,000	
Italy.....	51,441,000	51,809,000	60,300,000
Netherlands.....	96,226,000	109,656,000	89,600,000
Switzerland.....	27,925,000	34,355,000	25,700,000
Canada.....	125,575,000	104,346,000	75,300,000
United States.....	357,901,000	411,860,000	360,100,000
Totals, less Spain.....	792,124,000	912,133,000	745,600,000

ANALYSES OF PRECEDING TABLES.

Wheat.

Taking up for the present only the countries which during the present year have been

entirely open to external commerce, I find in Table A covering the production of wheat in these countries, the following general results:

Production of Wheat by Continents — (See Table A)

Countries.	1919.	1918.	Five years' average 1909-1913.
	Thousand Bushels.	Thousand Bushels.	Thousand Bushels.
NORTH AMERICA— Canada, United States and Mexico.....	1,144,247	1,118,513	891,815
SOUTH AMERICA— Argentina, Chili and Uruguay.....	189,000	204,270	169,427
AUSTRALASIA— Australia and New Zealand.....	50,000	87,101	97,570
AFRICA— Algeria, Egypt, Tunis and South Africa.....	67,212	102,334	81,869
ASIA— India, Japan, Korea, Persia and Russia-in-Asia.....	440,035	511,692	553,865
EUROPE— Great Britain and Ireland, Norway, Sweden, Denmark, Netherlands, Belgium, France, Spain, Portugal, Italy, Greece and Switzerland.....	599,538	690,751	739,679
Grand totals.....	2,490,032	2,714,661	2,534,225

Apart from the old Australasian stocks, which by this time have been reduced considerably by deterioration through the weevil and mice, North and South America have to furnish the deficiency in the supplies of Europe. North America produced only 26,000,000 bushels more wheat in 1919 than in 1918, but 252,000,000 bushels more than in the pre-war period. South America's production is estimated at 15,000,000 bushels less than that of last year but 20,000,000 bushels more than pre-war. Taken together, North and South America produced in 1919 only 10,500,000 bushels more than in 1918, but 272,000,000 more than in the pre-war period.

The production of Australasia, Africa and Asia need not be considered in detail. It is, however, to be noted that the present year's crop is 144,000,000 bushels short as compared with the previous one and 176,000,000 short of the pre-war average. Some of these countries, notably India, have been importers of considerable quantities of wheat. India has during the present year already imported

wheat for her own requirements, but, the present promise for the next crop being favourable, it is presumed that with the accumulated surplus stocks and the coming crop no great anxiety need be felt for its normal food supply in the immediate future. That portion of Europe freely open to commerce, being considerable importers of our products, is more important from our point of view. Here, where any deficiency is most keenly felt, I find this year's crop 91,000,000 bushels less than last year's and 140,000,000 less than the pre-war average. To this should be added a shortage of 28,000,000 bushels of rye, which, under the present circumstances, would be used almost exclusively for bread.

Taking the totals of the various continents together, they show that the wheat crop for 1919 is 224,629,000 bushels less than in 1918 and 44,000,000 bushels less than the pre-war average. Further reference will be made to wheat in dealing with the supply and demand situation.

Rye.—(Table B)

The production of rye is confined to a comparatively small number of countries. There are no figures available for Germany and Russia, where that crop is more important than wheat as a bread food. On this continent, while rye is not an important export cereal, it is used to a rapidly increasing extent for food and feed, a fact which is apparent from its larger production in Canada and the United States in recent years. Taking for our basis of comparison the pre-war average 1909-13, the totals for Canada and the United States for the pre-war average were only 37,400,000 bushels as compared with 98,685,000 in 1919, an increase of 61,285,000. While the United States in that period increased her production 150%, Canada increased hers 350%. Rye, therefore, from being an insignificant food factor before the war, has become of considerable importance on this continent Canada, with a pre-war acreage of only 143,000 cultivated last year 576,000; the United States with a pre-war acreage of 3,108,000 increased it to 7,063,000.

If the crop of 1919 be compared with that of 1918 there are noted but slight differences. Canada, however, increased her production by 2,000,000 bushels, while the United States lost as much.

Europe, shows on the contrary a decrease of 28,105,000 bushels, 21,367,000 bushels of this being shown for France alone.

Corn.—(Table E)

The world's supply of corn, which rests chiefly with the United States, has been well maintained at about 3,000,000,000 bushels. The United States crop of 1919 is 415,000,000 bushels larger than that of 1918 and nearly 210,000,000 bushels larger than the pre-war average.

Barley.—(Table C.)

The table shows for the whole group a decrease in production of nearly 40,000,000 bushels, as compared with the pre-war average. The United States and France reported the greatest losses, while Canada increased her production by over 12,000,000 bushels or 30%. Comparing further the details of

the whole group, there is found in 1919 a decrease from the 1918 production of 150,000,000 bushels. Canada and the United States account for 110,000,000 bushels. Of this Canada lost over 20,000,000 bushels while the United States lost 90,000,000 bushels.

Oats.—(Table D.)

Comparing last year's crop first with the pre-war average, I find that the total for the whole group is 90,000,000 bushels larger. Great Britain's crop is 20,000,000 bushels larger, Canada's is 68,000,000 bushels larger, and the United States 183,000,000 bushels larger than pre-war. However, comparison of the crop of 1919 with that of 1918 shows a decrease of 383,000,000 bushels. Of this Canada and the United States together represent a decrease of 320,000,000 bushels, Canada, however, losing only 32,000,000 bushels, whereas the United States loses 290,000,000 bushels. Great Britain produced 38,000,000 bushels less, then follow, with losses of importance in the order named, Italy, Algeria and France.

It appears, therefore, that in such typical feed cereals as barley and oats Canada is worse off this year than last by 53,000,000 bushels, whereas the United States is 380,000,000 bushels worse off. However, the United States has the compensating advantage, which Canada does not enjoy, of having a corn crop exceeding that of the previous year by 415,000,000 bushels.

Potatoes.—(Table F.)

The total production in 1919, viz.: 792,124,000 bushels, is 120,000,000 bushels less than in 1918 or 13 per cent and, excepting Spain, for which the pre-war average is not available, the production in 1919 is 53,476,000 bushels smaller than the pre-war average.

It is to be noted here that while Britain and the United States produced in 1919 about the same quantity as the pre-war average, Canada exceeded it by 50,000,000 bushels. The combined crops of the United States and Canada are in 1919 32,000,000 bushels less than those of the previous year but, whereas the United States lost in the comparison nearly 54,000,000 bushels, Canada gained over 21,000,000 bushels.

NUMBERS OF LIVE STOCK BEFORE AND AFTER THE WAR.
CATTLE.

Countries.	Recent estimate.		Before the war.		Difference.	
	Date.	Number.	Date.	Number.	Increase.	Decrease.
Great Britain.....	June 4, 1919	7 423, 429	June 4, 1914	7 092 918	330, 511	188, 363
Ireland.....	June 1, 1918	4 863, 282	June 1, 1914	5 051 645	5 051 645	1 472, 854
France.....	June 30, 1918	13 314, 856	Dec 31, 1913	14 787 710	14 787 710	56, 602
Italy.....	April 7, 1918	6 162 259	Mar. 31, 1908	6 198 861	6 198 861	108, 456
Spain.....	Dec 31, 1916	3 070 903	Dec. 31, 1913	2 878 856	192, 047	339 140
Norway.....	June 20, 1918	1 037 818	Sept. 30, 1914	1 146 274	311, 513	950 000
Sweden.....	June 1, 1918	2 584 159	Dec. 31, 1913	2 272 646	311, 513	127, 990
Denmark.....	July 15, 1918	2 123 722	July 15, 1914	2 462 862	311, 513	3, 767, 344
Belgium.....	1919	899, 000	Dec. 31, 1913	1 849 000	950, 000	6, 990, 749
Netherlands.....	Mar. —, 1919	1 968 609	June —, 1913	2 096 599	127, 990	6, 069, 996
Switzerland.....	April 18, 1918	1 530, 165	April 31, 1911	1 443 483	86, 682	8-9
Germany.....	1919	17, 227, 000	Dec. 1, 1913	20, 994, 334	3, 767, 344	17-9
Total 11 European countries.....		62, 205, 202		68, 275, 188	920, 753	6, 990, 749
Total decrease.....					4 047, 194	67-0
Canada.....	June 30, 1919	10, 084, 011	June 30, 1914	6 036, 817	11, 274, 000	20-0
United States.....	Jan. 1, 1919	67 866, 000	Jan. 1, 1914	56, 592, 000	472, 142	868, 043
Australia.....	Dec. 31, 1917	11, 956, 024	Dec. 31, 1913	11, 483, 882	2, 020, 171	1, 183, 000
New Zealand.....	Jan. 31, 1918	2, 888, 214	April 1, 1911	25, 867, 000	17, 844, 379	17-5
Argentina.....	Jan. 31, 1918	27, 050, 000	June 1, 1914	101, 999, 870		
Total 5 surplus countries.....		119, 844, 249				

Increase, all countries, 11, 774, 383—6.9%.

Table H.

SHEEP.

Countries.	Recent estimate.		Before the war.		Difference.	
	Date.	Number.	Date.	Number.	Increase.	Decrease.
Great Britain.....	Jan. 4, 1919	21, 518, 914	June 4, 1914	24, 285, 514	26, 592	2, 766, 600
Ireland.....	June 1, 1918	3, 627 173	June 1, 1914	3, 600, 581	26, 592	6, 635, 075
France.....	June 30, 1918	9, 496, 315	Dec. 31, 1913	16, 131, 390	588, 649	429, 130
Italy.....	April 7, 1918	11, 751, 575	Mar. 31, 1908	11, 162, 926	588, 649	142, 037
Spain.....	Dec. 31, 1916	16, 012, 277	Dec. 31, 1913	16, 441, 407	437, 079	44, 857
Norway.....	June 20, 1918	1, 184, 813	Sept. 30, 1914	1, 326, 850	142, 037	404, 943
Sweden.....	June 1, 1918	1, 409, 473	Dec. 31, 1913	972, 594	437, 079	221, 837
Denmark.....	July 15, 1918	470, 051	July 15, 1914	514, 908	437, 079	10, 644, 479
Netherlands.....	Mar. —, 1919	437, 075	June —, 1913	842, 018	404, 943	9, 538, 492
Switzerland.....	April 19, 1918	225, 081	April 21, 1911	161, 414	63, 667	92, 300
Germany.....	1919	5, 299, 000	Dec. 1, 1913	5, 520, 837	221, 837	92, 300
Total 10 European countries.....		71, 431, 747		80, 960, 239	1, 115, 987	4, 748, 969
Total decrease.....					1, 363, 013	11-8
Canada.....	June 30, 1919	3, 421, 058	June 30, 1914	2, 058, 045	1, 363, 013	66-2
United States.....	Jan. 1, 1919	40, 862, 000	Jan. 1, 1914	48, 717, 000	144, 000	92, 300
Australia.....	Dec. 31, 1917	84, 538, 002	Dec. 31, 1913	85, 567, 002	1, 739, 000	7-0
New Zealand.....	April 26, 1918	26, 538, 002	April 30, 1914	24, 950, 000	1, 625, 000	3-8
Argentina.....	April 26, 1918	44, 850, 000	June 1, 1914	43, 225, 000	1, 625, 000	3-8
Total 5 surplus countries.....		209, 637, 970		204, 858, 447	4, 871, 913	2-3
Total increase.....					4, 779, 523	1-7
Decrease, all countries.....						

NUMBERS OF LIVE STOCK BEFORE AND AFTER THE WAR.—Continued.

SWINE.

Table I.

Countries.	Recent estimate.		Before the war.		Difference.	
	Date.	Number.	Date.	Number.	Increase.	Decrease.
Great Britain.....	Jan. 4, 1918	1,937,189	June 4, 1914	2,634,249	.....	697,060
Ireland.....	Jan. 1, 1918	1,074,383	June 1, 1914	1,395,248	.....	321,253
France.....	June 30, 1918	4,020,897	Dec. 31, 1913	7,095,850	.....	3,014,953
Italy.....	April 31, 1918	2,337,304	Mar. 19, 1908	2,597,798	.....	170,494
Spain.....	Dec. 31, 1918	2,814,465	Dec. 31, 1913	2,770,185	.....	.....
Norway.....	June 20, 1918	209,280	Sept. 30, 1913	278,117	104,280	.....
Sweden.....	June 1, 1918	633,862	Dec. 31, 1913	977,412	.....	18,831
Denmark.....	July 15, 1918	620,880	Dec. 31, 1913	2,496,706	.....	343,550
Belgium.....	July 1, 1919 (a)	318,000	July 15, 1913	1,452,000	.....	1,875,826
Netherlands.....	Mar. 1919	449,829	Dec. 31, 1913	1,350,204	.....	1,144,000
Switzerland.....	April 19, 1918	344,468	June 1, 1913	570,226	.....	900,578
Germany.....	—, 1919 (a)	10,080,000	April 21, 1911	25,659,140	.....	205,738
Total 11 European countries.....	.....	24,760,565	Dec. 1, 1913	48,937,725	104,280	15,579,140
Total decrease.....	.....	.....	.....	.....	.....	24,281,440
Canada.....	June 30, 1919	4,040,070	.....	.....	.....	24,177,160
United States.....	Jan. 1, 1919	75,587,000	June-30, 1914	3,434,261	.....	49.4
Australia.....	Dec. 31, 1917	1,168,989	Jan. 1, 1913	58,933,000	605,809	.....
New Zealand.....	Jan. 31, 1918	238,000	Dec. 31, 1913	800,505	16,634,000	.....
Total, 4 surplus countries.....	.....	81,054,059	April 1, 1911	349,000	368,484	91,000
Total increase.....	.....	.....	.....	.....	.....	91,000
Decrease, all countries.....	.....	.....	.....	.....	.....	6,639,867
.....	.....	.....	.....	.....	.....	5.9

ANALYSES OF LIVE STOCK STATISTICS

There are presented here figures for 11 European countries, most of which are importers of meats, and 5 ex-European countries, all of which are to a greater or lesser extent exporters. Belgium and Germany are the only countries, previously closed to commerce through the war, concerning which any data are at this time available. The comparison in the tables is between the most recent year and the year before the war nearest to its outbreak for which statistics are available.

Cattle.—(Table G.)

The notable decreases are for France 1,472,854 head and for Germany 3,767,344, respectively 10% and 17.9%. The totals of the European group compare as 62,205,202 to 68,275,188, a net total decrease of 6,069,996 or 8.9%.

The export group, on the contrary, with the notable increases of 11,000,000 and 4,000,000 head respectively in the United States and Canada shows a total of 119,844,249 compared with 102,000,000, an increase of 17,844,379 or 17.5%. Deducting the decrease of Europe we reach a total net increase for the two groups of 11,774,383 or 6.9%.

Canada, having changed its system of gathering statistics, it is contended that the increase recorded for Canada is excessive. The discrepancy appears more clearly by comparison with the United States figures. Although the same observation might be applied to sheep and swine, the discrepancy does not appear as great.

Milch cows not having been separated from "Other Cattle" in the data available in most of the countries appearing in the live stock tables, the two classes of stock had to be combined with the results which have just been mentioned. The requisite data being available for the United States and Canada, the following analysis of results will be interesting. Here the figures for the United States and Canada are first combined, then they are considered for each class of stock separately.

Milch Cows.—The total number of milch cows in Canada and the United States in 1919 was 27,014,000 against 26,854,000 in 1918, an increase of 160,000, and 23,410,000 in 1914, an increase of 3,604,000, or 15.4%. In Canada the number of milch cows in 1919 was 3,547,000 against 3,544,000 in 1918, an increase of 3,000, and 2,673,000 in 1914, an increase of 874,000, or 32.7%. The number of milch cows in the United States in 1919 was 23,467,000 against 23,310,000 in 1918, an increase of 157,000, and 20,737,000 in 1914, an increase of 2,730,000 or 13.1%.

Other Cattle.—The total number of cattle outside of milch cows in Canada and the United States in 1919 was 50,936,000 against 50,619,000 in 1918, an increase of 317,000, and 39,219,000 in 1914, an increase of

11,717,000, or 30%. The number of other cattle in Canada in 1919 was 6,537,000 against 6,507,000 in 1918, an increase of 30,000, and 3,364,000 in 1914, an increase of 3,173,000 or 94%. The number of cattle outside milch cows in the United States in 1919 was 44,399,000 against 44,112,000 in 1918, an increase of 287,000, and 35,855,000 in 1914, an increase of 8,544,000 or 24%.

Sheep.—(Table H.)

In the European group the decrease of 6,635,075 or 41% for France alone is quite notable. There is also a decrease in Great Britain of 2,766,600 or 11.6%. The totals for Europe indicate a net decrease of 9,528,492 or 11.8%. In the export group the increases in Canada, New Zealand and Argentina are considerable, being 66.2%, 7% and 3.8% respectively, a total net increase for the group of 4,779,523 or 2.3%. It appears that in sheep both the United States and Australia are out of line with the other exporting countries and have no more than maintained their flocks undiminished in numbers.

The total number of sheep in Canada and the United States in 1919 was 53,285,000 against 51,653,000 in 1918, an increase of 1,632,000 or 3%, and 51,777,000 in 1914, an increase of 1,508,000 or 3%. The number of sheep in Canada in 1919 was 3,422,000 against 3,053,000 in 1918, an increase of 369,000 or 12%, and 2,058,000 in 1914 an increase of 1,364,000 or 66%. In the United States the number of sheep in 1919 was 49,863,000 against 48,603,000 in 1918, an increase of 1,260,000 or 3%, and 49,719,000 in 1914, an increase of 144,000.

Swine.—(Table I.)

The European group indicates decreases quite alarming for Germany at 15,579,140 or 60.7%, and for Belgium, Denmark, France and Great Britain respectively in the order named: 78%, 75%, 42.8%, and 26.5%. The total decrease for Europe of 24,177,160 indicates a decrease of 49½%.

In the export group, owing to the notable increase of 16,654,000 or 28.2% for the United States, there is exhibited a total increase for the group of 17,537,293 or 27.6%. This total, applied against the European decrease, shows a net decrease for the two groups of 6,639,867 or 5.9%.

The total number of swine in Canada and the United States in 1919 was 79,627,000 against 75,268,000 in 1918, an increase of 4,359,000 or 6%, and 62,367,000 in 1914, an increase of 17,260,000 or 28%. In Canada the number of swine in 1919 was 4,040,000 against 4,290,000 in 1918, a decrease of 250,000 or 6%, and 3,434,000 in 1914, an increase of 606,000 or 15%. In the United States the number of swine in 1919 was 75,587,000 against 70,978,000 in 1918, an increase of 4,609,000 or 6%, and 58,933,000 in 1914, an increase of 16,654,000 or 28%.

WHEAT—DEMAND SITUATION.

Table J.

Countries.	Crops 1919.	Normal Consumption.	Indicated Requirements.	Probable imports.
	Bushels.	Bushels.	Bushels.	Bushels.
Great Britain and Ireland.....	71,000,000	276,000,000	205,000,000	130,000,000
France.....	178,000,000	361,000,000	183,000,000	130,000,000
Italy.....	170,000,000	237,000,000	67,000,000	60,000,000
Spain.....	136,000,000	136,000,000		
Portugal.....	6,000,000	8,000,000		2,000,000
Greece and Jugo-Slavia.....	4,000,000			15,000,000
Belgium.....	10,000,000	65,000,000	55,000,000	40,000,000
Netherlands, Switzerland, Norway, Sweden and Denmark.....	24,000,000			40,000,000
Egypt, Mesopotamia, Constantinople and Turkey.....				15,000,000
Germany.....				80,000,000
Austria, Hungary, and Czecho-Slovakia.....				60,000,000
Total for Europe.....				632,000,000
Ex-Europe.....			60,000,000	48,000,000
World's aggregate requirements.....				680,000,000

WHEAT—SUPPLY SITUATION.

Table K.

Countries.	Carry-over Aug. 1, 1919, beginning of crop year.	Pro-duction 1919.	Home needs and waste.	Prob-able export.	Carry-over Aug. 1, 1920.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
Canada.....	15,000,000	193,000,000	91,000,000	105,000,000	12,000,000
United States.....	40,000,000	941,000,000	631,000,000	310,000,000	40,000,000
Argentina.....	112,000,000	170,000,000	78,000,000	150,000,000	54,000,000
Australia.....	138,000,000	44,000,000	50,000,000	100,000,000	32,000,000
Totals.....	305,000,000	1,348,000,000	850,000,000	665,000,000	138,000,000

MONTHLY EXPORTS OF WHEAT 1919-20.

Table L. (Including flour for Canada and the United States).

Months.	Canada.	United States.	India.	Australia.	Argentina.	Total for five countries.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
1919						
August.....	9,562,000	20,310,000		10,508,000	13,528,000	53,908,000
September.....	4,247,000	24,816,000		8,800,000	15,804,000	53,667,000
October.....	6,454,000	20,979,000		10,632,000	16,824,000	54,889,000
November.....	12,138,000	23,396,000		11,568,000	11,852,000	58,954,000
Total for 4 months..	32,401,000	89,501,000		41,508,000	58,008,000	221,418,000

SUMMARY REVIEW OF PRECEDING DATA.

Cereals.—Speaking of wheat only, the chief factor in the food supply, the three tables immediately preceding show that the estimated requirements of Europe along the litoral of the Mediterranean and outside of Europe, chiefly in the Southern Hemisphere, amount to 680,000,000 bushels, and that the probable exports amount to 665,000,000 bushels. The actual exports recorded in the last table, namely 221,000,000 bushels, for the first four months of the grain year, should they continue at the same rate for the remaining eight months, would amount to 663,000,000 bushels, against our estimated total of 665,000,000. The difference between the 663,000,000 bushels and the requirements

of 680,000,000 bushels, namely 17,000,000 bushels, might well be supplied from the Ukraine and other portions of Southern Russia.

So much for wheat, of which the world's supplies are sufficient if adequate shipping be available for handling it and other limiting factors can be controlled. But taking into consideration only the three typical food staples, wheat, rye and potatoes together I find from the preceding tables shortages in Europe of 91,000,000, 28,000,000, and 87,000,000 bushels respectively, representing a total of 206,000,000 bushels. The shortage in potatoes especially is difficult to supplement from abroad and may mean considerable privation.

It happens that Europe's shortage of such food substitutes as barley and oats coincide with a pronounced shortage on this continent, so that but little relief may be expected from that quarter. The larger corn crop in 1919 for the United States will probably be absorbed by the existing largely increased live stock population, which is confronted with a corresponding shortage of oats and barley.

During the course of the war rice was used to some extent in Europe as a substitute for other bread foods. The 1918-19 crop, however was generally a short one, India having harvested only three-fifths of a crop. The 1919-20 crop, however, promises better, Japan having already reaped a crop 10% ahead of last year's and the Indian crop is progressing under favourable conditions.

Live Stock.—It appears from the tables that the decreases in Europe, as compared with the pre-war period, are as follows:

Cattle (comprising milch cows).....	6,070,000 or 8.9
Sheep.....	9,528,000 or 11.8
Swine.....	24,177,000 or 49.5

These large decreases are offset for cattle by an increase, chiefly on this continent, of nearly 18,000,000 head or 17.5%. There results, in consequence, a net increase for all countries mentioned of over 11,000,000 head or 6.9%. For sheep the increase in the export group of about 4,750,000 head or 2.3% does not cover the European deficiency,

so that there is a net world decrease of 4,749,000 or 1.7%. For swine the increase in the export group of over 17,000,000 head or 27.6% fails of compensating the European losses, so that there is for the two groups a net decrease of 6,639,000 head or 5.9%.

On account of their direct relation to the live stock interests, it might be observed that the hay crops of both the United States and Canada were better in 1919 than in the preceding year, the United States having harvested 108,000,000 tons against 91,000,000 the previous year, and Canada 16,500,000 tons against 14,800,000 for last year.

It is readily discerned from this analysis how desperate is the live stock situation in Europe, while the increased live stock population elsewhere, and especially on this continent, affords the basis for a lucrative export business during the next few years. The stocks of swine and sheep may soon be replaced, but the replenishment of the cattle will be a comparatively prolonged process.

The limiting factors in the way of exports both of cereals and of live stock are, however, numerous. Account has to be taken in particular of shipping facilities and credit, adverse exchange, high ocean freight rates and insurance, reduced purchasing power of the European nations, reduction of the adult population and, to a limited extent, the substitution of vegetables and other home grown and coarse cereals for wheat, the most readily exported cereal.

FOREIGN CROP CONDITIONS

United Kingdom.—Mild, stormy weather prevailed throughout the last half of December. There was a good deal of rain and the land was sodden in many places.

France.—In the last part of December the weather was still wet and unseasonable and field work was hindered considerably. There were no complaints about the young seedlings. The 1919 wheat crop was officially estimated at 178,000,000 against 226,000,000 in 1918, and a pre-war five year average of 318,000,000.

Belgium.—At the end of December early sown grain was generally satisfactory, but late sown had developed slowly owing to cold. Autumn seeding had not been completed in some districts and a reduction in the wheat area was forecasted. Crops are expected to be poor, owing to lack of fertilizers and scarcity of flour.

Spain.—At the end of December the weather was favourable and the condition of the new crop satisfactory.

Italy.—The outlook for the new crops remained favourable at the end of December. Rain was rather urgently needed. Field mice were causing considerable damage.

Roumania.—Early reports as to the acreage of the new winter wheat crop were very pessimistic. Much more favourable reports were coming to hand at the end of

December, the weather having permitted growers to make additional sowings.

Russia.—At the end of December there was further confirmation of a fine crop and a large export surplus. There is some hope that a start may soon be made with exporting barley, and wheat may be moved in the spring if the new crops are then shaping well and it is possible to bring the grain to the ports. At present export permits are very difficult to obtain, even for such articles as wool, hides, etc.

Poland.—The Warsaw correspondent of "The Times" reports the food situation as very serious. Nominally the town and the industrial population of Poland requires over 20,000 tons of grain per week. For the last few weeks the deliveries have fallen to 4,000 tons. For nearly three weeks there has been no bread in Government shops, and uncontrolled bread fetches 10 mks. a pound. The price of rye in illegal trades has been 300 mks. per 100 kilos. against the Government price of 80 mks. A thaw has set in which to some extent relieves the sufferings of the poor. The causes which have brought about famine so soon after the harvest will affect the food supply of the country for a whole season. Production has been below the normal, and throughout the war area has been smaller, while fertilizers have been scarce.

The harvest is poor and late, leaving the farmers no time to thresh, and in some sections threshing was hindered through lack of fuel. The Government estimates a grain shortage of 740,000 tons, which is thought to be excessive, but the deficit will not be less than 650,000 tons. The most positive and favourable effect on the situation has been produced by the promise of American grain. America is already sending 100,000 tons to meet the deficit, and it seems likely that the greater part of the balance will have to come from there, as no great amount can be had from Roumania and the Ukraine. The early frost ruined the potato crop. Potatoes come second only to bread as a staple article of food in Poland, hence the seriousness of the grain shortage.

Austria.—In Austria the terrible food scarcity is apparently going from bad to worse. We are assured from time to time that some supplies are going in to the country, but according to the Austrian Chancellor, there is not enough food on hand to assure even a starvation ration of $3\frac{1}{2}$ oz. of bread per person per week.

Germany.—Early in December there were reports that the early arrival of winter caused a considerable reduction in the acreage of wheat and rye. In Saxony the decrease is 20 per cent of the 1918-19 average, which latter was small. The Economic Minister recently stated that the ordinary town dweller has to make shift with a weekly ration of $4\frac{1}{2}$ lb. of bread, $3\frac{1}{2}$ oz. of meat, 2 lb. of potatoes, a trifle of fat and no milk. Import of food-stuffs is possible in a very restricted degree owing to the high cost. Later reports state that the weather was generally mild in December which enabled farmers to resume ploughing as well as to continue the lifting of roots and potatoes. It was reported, however, that the acreage of winter wheat is very seriously below the

normal. The latest official report of this year's harvest in Prussia gives the following estimates of the chief crops: wheat 45,600,000 bushels against 48,800,000 in 1918; rye 250,000,000 bushels against 193,600,000 in 1918; barley 47,500,000 bushels against 46,650,000 bushels in 1918.

Czecho-Slovakia.—The wheat yield for 1919 is put at 14,892,000 bushels, rye 31,880,000 bushels, barley 19,774,000 bushels, and oats 38,069,000 bushels.

Bulgaria.—At the end of November German papers reported that Bulgaria will have large supplies of wheat and corn to sell this season.

Turkey.—The quality of this year's wheat crop is reported to be below normal. Most of the supplies for Constantinople come from Asia Minor and are being greatly delayed by the disorganization of the railways East of the Bosphorus.

Algeria.—Fairly good seeding rains fell about mid-December, and it was expected that the acreage under wheat would show no substantial increase.

India.—It was reported late in December that the unirrigated area under wheat in the Punjab will be smaller than usual, but as most of the wheat is grown on irrigated land there is no reason to estimate the total crop to be harvested next spring as less than the pre-war average of 352,000,000 bushels, from which a fair quantity may be spared for export.

Argentina.—At the end of December harvest was progressing with favourable weather generally. Rains had fallen in most districts, but there was no news of damage or serious delay to the harvest.

Australia.—The weather was unsettled in the latter part of December. There is still a good surplus of old wheat in the country, but the new crop will be barely sufficient for home use.

UNITED STATES FINAL CROP REPORT FOR 1919

The December estimates of the Crop Reporting Board of the U.S. Bureau of Crop Estimates of the acreage, production and value (based on the prices paid to farmers on Dec. 1) of important farm crops of the United

States in 1919 and 1918, with the average for five years 1913-1917, based on the reports of the correspondents and agents of the Bureau, are as follows (1918 figures revised):

Crop.	Acreage	Production			Farm value Dec. 1	
		Per acre.	Total	Unit	Per Unit	Total
					Cents	Dollars
Corn:						
1919.....	102,075,000	28.6	2,917,450,000	Bus.	134.9	3,934,234,000
1918.....	104,467,000	24.0	2,502,665,000	"	136.5	3,416,240,000
Av. 1913-17.....	107,496,000	25.6	2,749,349,000	"	82.5	2,267,560,000
All wheat:						
1919.....	73,243,000	12.8	940,987,000	"	215.1	2,024,008,000
1918.....	44,349,000	15.6	921,438,000	"	204.2	1,881,826,000
Av. 1913-17.....	52,320,000	15.1	790,634,000	"	119.6	945,837,000
Oats:						
1919.....	42,400,000	29.4	1,248,310,000	"	71.7	895,603,000
1918.....	44,349,000	34.7	1,538,124,000	"	70.9	1,090,322,000
Av. 1913-17.....	40,583,000	32.8	1,331,287,000	"	48.3	643,187,000
Barley:						
1919.....	7,420,000	22.3	165,719,000	"	120.9	200,419,000
1918.....	9,740,000	26.3	256,225,000	"	91.7	234,942,000
Av. 1913-17.....	7,780,000	25.6	199,212,000	"	72.4	144,242,000
Rye:						
1919.....	7,063,000	12.5	88,478,000	"	134.5	119,041,000
1918.....	6,391,000	14.2	91,041,000	"	151.6	138,038,000
Av. 1913-17.....	3,151,000	15.9	50,001,000	"	109.0	54,489,000
Buckwheat:						
1919.....	790,000	20.6	16,301,000	"	147.4	24,026,000
1918.....	1,027,000	16.5	16,905,000	"	166.5	28,142,000
Av. 1913-17.....	824,000	17.8	14,691,000	"	100.7	14,792,000
Flaxseed:						
1919.....	1,683,000	5.3	8,919,000	"	438.9	39,145,000
1918.....	1,910,000	7.0	13,369,000	"	340.1	45,470,000
Av. 1913-17.....	1,756,000	7.9	13,818,000	"	182.2	25,170,000
Rice:						
1919.....	1,089,800	37.7	41,059,000	"	267.0	109,613,000
1918.....	1,118,550	34.5	38,606,000	"	191.8	74,042,000
Av. 1913-17.....	835,000	36.9	30,788,000	"	112.0	34,468,000
Potatoes:						
1919.....	4,013,000	89.2	357,901,000	"	161.4	577,581,000
1918.....	4,295,000	95.9	411,860,000	"	119.3	491,527,000
Av. 1913-17.....	3,812,000	96.0	366,046,000	"	88.0	322,292,000
All hay:						
1919.....	72,034,000	1.51	108,666,000	Tons	\$19.59	2,129,087,000
1918.....	71,120,000	1.28	91,139,000	"	\$19.35	1,763,981,000
Av. 1913-17.....	68,573,000	1.41	96,911,000	"	\$11.80	1,143,894,000
Tobacco:						
1919.....	1,901,200	730.8	1,389,458,000	Lb.	39.0	542,547,000
1918.....	1,647,100	873.7	1,439,071,000	"	28.0	402,264,000
Av. 1913-17.....	1,348,000	809.1	1,090,641,000	"	14.5	158,059,000
Cotton:						
1919.....	33,344,000 (1)	158.2	11,030,000	Bale	(1) 35.7	1,967,143,000
1918.....	36,008,000 (1)	159.6	12,040,532	"	(1) 27.6	1,663,633,000
Av. 1913-17.....	34,832,000 (1)	176.5	12,847,108	"	(1) 15.4	946,339,000
Clover seed:						
1919.....	686,000	1.6	1,099,000	Bus.	\$26.45	29,067,000
1918.....	820,000	1.5	1,197,000	"	\$19.80	23,705,000
Sugar beets:						
1919.....	696,503	9.18	6,396,860	Ton.	\$10.75	68,750,000
1918.....	594,010	10.01	5,948,798	"	\$10.00	59,494,000
Av. 1913-17.....	600,962	10.05	6,038,181	"	\$ 6.07	36,642,000
Beet sugar:						
1919.....	696,503	2.193	1,527,696,000	Lb.		
1918.....	594,010	2.562	1,521,900,000	"		
Av. 1913-17.....	600,962	2.606	1,566,216,000	"		
Cane sugar (La):						
1919.....	176,500	1,310	231,179,000	"		
1918.....	231,200	2,430	561,800,000	"		
Av. 1913-17.....	221,800	2,201	488,159,000	"		
Maple sugar and syrup (as sugar):						
1919.....	(2) 19,002,700	(2) 2.18	41,506,800	"	(2) 26.9	11,172,000
1918.....	(2) 19,312,200	(2) 2.72	52,513,000	"	(2) 23.1	12,122,000
Peanuts:						
1919.....	1,251,400	26.6	33,263,000	Bus.	240.0	79,839,000
1918.....	1,865,400	24.7	46,010,000	"	173.7	79,929,000

(1) Pounds per acre and cents per pound.

(2) Trees tapped.

(3) Per tree.

PRODUCTION OF VEGETABLE SEEDS IN THE UNITED STATES

(U.S. Department of Agriculture, Special Seed Report, Dec. 4, 1919.)

Kind of Seed.	Commercial acreage planted		Average Yield per acre, based on acreage planted		Commercial Production	
	1919	1918	1919 Est.	1918	1919 Est.	1918
	Acres	Acres	Pounds	Pounds	Pounds	Pounds
Beans—Dwarf snap.....	48,658	72,831	515	401	25,093,000	29,215,515
Beans—Garden pole.....	7,957	7,482	540	691	4,395,000	5,166,159
(not including Lima).....						
Beet—Garden.....	2,666	2,801	697	896	1,858,000	2,509,391
Beet—Mangel.....	619	424	1,003	677	621,000	286,974
Beet—Sugar.....	11,139	6,014	600	980	6,700,000	5,900,000
Cabbage.....	1,978	1,383	700	117	1,383,000	161,629
Carrot.....	3,465	4,894	450	471	1,562,000	2,125,060
Celery.....	135	176	400	228	54,000	40,201
Cucumber.....	3,582	3,177	214	173	766,300	548,044
Kale.....	106	49	406	342	43,000	16,744
Lettuce.....	2,283	2,291	298	326	679,800	746,993
Muskmelon.....	1,467	1,671	102	117	149,900	196,142
Watermelon.....	5,508	10,423	90	92	500,000	959,549
Onion Seed.....	6,730	7,260	389	232	2,618,000	1,685,258
Onion Sets.....	3,708	3,818	5,900	12,066	21,900,000	46,068,711
Parsley.....	146	155	764	468	111,500	72,553
Parsnip.....	303	267	732	626	222,000	167,199
Peas—Garden.....	104,172	102,095	460	569	47,968,000	58,127,258
Pepper.....	160	657	75	86	12,000	56,195
Pumpkin.....	1,156	1,380	95	96	110,300	132,612
Radish.....	10,870	8,760	233	221	2,537,000	1,935,047
Salsify.....	205	124	452	247	92,600	30,647
Spinach.....	1,139	4,259	317	387	361,000	1,650,005
Squash—Summer.....	1,153	1,004	195	99	223,000	99,404
Squash—Winter.....	2,912	2,534	152	51	443,400	128,385
Sweet corn.....	14,565	14,759	900	807	13,143,000	11,916,892
Tomato.....	3,604	3,832	67	80	243,000	307,815
Turnip—English.....	1,207	936	380	215	456,000	200,783
Turnip—Swede.....	205	279	602	98	123,300	27,312

SEED PRODUCTION IN DENMARK

(From information furnished by S. Sorensen, agricultural adviser to the Danish Government.)—

Before the war the production of seeds in Denmark was small. Low prices that prevailed in Denmark from the beginning of the war until 1916 offered little incentive to increase the acreage planted for seed production. After that year large quantities of seeds, especially vegetable seeds, were needed in European countries, and seed prices rose consequently until they reached a point never attained before. The high prices induced many farmers to take up the growing of seeds and several new export firms were established. Many of these new growers and dealers, lacking the knowledge and experience of old growers and well-established firms and frequently being unable to obtain satisfactory stock seed for planting, could not maintain the high

quality of certain kinds of seeds that had characterized these Danish-grown seeds in the past. As a result of the stimulation in seed production in Denmark, as well as in a few countries, large surpluses of some kinds of seed were produced. Prior to the war only a few hundred acres were planted to vegetable seeds (excluding field root-crop seeds) in Denmark, but during 1918 an acreage of 5,252, which was increased to 6,975 acres in 1919, was planted, mostly to different kinds of cabbage and to a lesser extent to radish, spinach, and garden beet.

The commercial acreage of each of the kinds or classes of seed in Denmark for the pre-war year, 1912, and for the years 1916-1919 is shown in the following table:

Kinds of Seed	1919	1918	1917	1916	1912
Beet, Mangel.....	5,310	4,987	3,410	2,922	3,275
Turnip, Swede.....	7,790	6,120	2,557	2,372	1,652
Turnip, English.....	16,677	8,047	1,897	3,317	2,210
Carrot (Field and Garden).....	4,042	4,350	1,505		
Beet, Sugar.....	802	87			
Clover, etc.....	3,317	1,217	2,237	2,665	1,667
*Grass.....	40,545	38,620	32,597	30,977	30,615
Total.....	78,483	63,428	44,203	42,253	39,419

*Approximately 50% orchard grass; 20% Italian and perennial English rye grass; 15% meadow fescue; and 15% other grasses.

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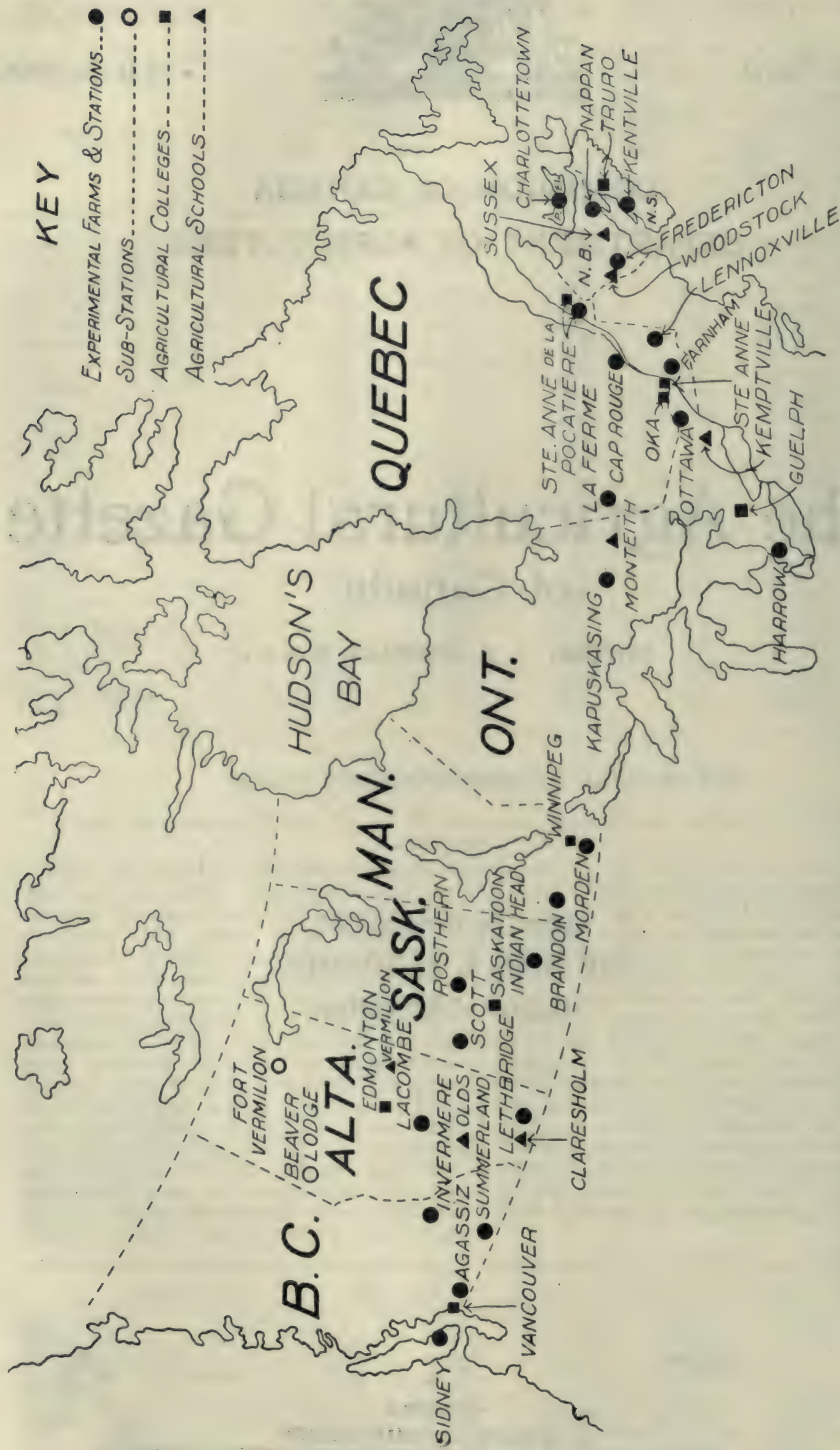
DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE

The Agricultural Gazette of Canada

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MAP OF CANADA SHOWING THE LOCATIONS OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

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THE LOCAL AGRICULTURAL SCHOOL

HALF a century ago the educational needs of our rural people were almost negligible. We were then in the pioneer stage. To-day education is a prime requisite for success in agriculture. We are now past the pioneer period and are striving for larger returns from labour, and a fuller, more contented rural life for our families. To secure larger returns it is necessary that we learn how to farm properly; to acquire the fuller life in the country we must know our duties toward our fellow men. The growing and husbanding of crops is important, but a broad culture for every man, woman, and child is more so if life and labour in rural communities is to be remunerative and otherwise attractive.

The Canadian rural problem is largely a question of agricultural production. To bring about better living conditions we must revise our methods of agriculture. Soil exploitation must be superseded by scientific tillage based on known principles; the fertility of our fields must be maintained, and depleted soils must be built up. In short, our youth must be schooled in the science and art of farming. Scientific agriculture is a partial solution only; we must go further. Our rural people are not living to themselves alone, as in pioneer days. It is now our duty to understand our social problems, which are many, and these must be solved in order that country life will attract and hold an adequate population.

To bring about the betterment of rural conditions necessitates the preparation of leaders who must be trained, in theory and practice, for their work in rural communities. These leaders must know conditions as they actually exist; and who are better able to grasp the situation than the sons and daughters of the farm? These men and women, when given the advantage of an education, will accomplish this purpose. But here is our difficulty; our colleges and universities are closed to these people who have not had the required preparatory education. Their elementary schooling is deficient. They know nothing of high school subjects and they have not complied with the entrance requirements to higher institutions of learning. In many cases the most capable of the young people have already reached maturity, and cannot be expected to go through the years of preliminary training necessary to fit them for a college course. Some other scheme of training is required.

In his article in Part II of this issue of THE AGRICULTURAL GAZETTE, the Hon. Duncan Marshall shows how Alberta is solving the problem. Alberta has grasped the situation and is preparing leaders in her schools of agriculture. She realizes that to-day education is the prime factor in rural progress. Her schools of agriculture are endeavouring to enlighten the farm boys and girls on whom the country depends for the production necessary to keep pace with the demands made by the industrial world.

In other provinces we find this problem is a live issue, and educationists have searched for a suitable system of schools wherein the country folk may be trained for their life work, and for good citizenship. The educational system of Denmark, the land of enlightened farmers, has made a strong appeal to Canadians. This system has lifted the peasantry to a prominent place in the national life; it has shaped the agricultural policy of the people, and has raised Denmark to an exalted position among the producing nations of Europe. The principles which have contributed to the agricultural prosperity in that country are worthy of our emulation.

The local agricultural schools of Denmark, numbering twenty-three regular and three special institutions, as well as a dozen schools of household economy, have sprung from the folk high schools. With their contiguous experimental farms they form a system of rural educational centres complete enough to furnish a broad general culture, properly balanced with the practical and technical. Students from nineteen to thirty-five years of age, whose preliminary training is equal and whose interests are similar, attend and study for the pleasure of learning what will fit them for their life work. These young folks become self reliant and well developed mentally and physically. The dormitory plan of student life gives them the assurance and

poise necessary for leadership while the gymnastics and farm practice maintain physical vigour. The product of these institutions is their best recommendation.

On his return from a recent trip to Europe Dr. J. W. Robertson expressed himself strongly in favour of a system of education for the farming people of Canada such as is followed in Denmark. The young men and women of Canada's rural districts need the training procurable through a term or two in an agricultural school were similar interests, and a common endeavour, are spurring the whole student body on to higher achievement. The dormitory life enhances their ambitions, weans them from the petty non-essentials of life, and, through the exchange of ideas among this consolidated group of students in a wholesome environment, each one learns to consider the views of the other. It is not advocated that we accept the Danish system literally but we can with profit adopt her principles of education and build up, on a similar foundation, a super-structure which will meet the needs of our rural communities. The schools of agriculture in Alberta are based on these principles. They are giving satisfaction, and that they are meeting with the approval of the Alberta people is evidenced by the fact that three similar schools in addition to those already built are now under construction.

In addition to local agricultural schools providing instruction in the fundamental principles of agriculture, they will relieve the congestion at present experienced in some of the agricultural colleges where the enrolment of the first two years is taxing both the staff and the accommodation. The work covered being similar to the two years course at the colleges, these schools would act as preparatory schools for those students who desire to go further and specialize in the various branches of agricultural science.

PART I

Dominion Department of Agriculture

EXPERIMENTAL FARMS

TRAINING RETURNED SOLDIERS

At many of the farms under the Dominion Experimental Farms System returned men have been employed as paid farm hands while a few have worked for limited periods at the Central Experimental Farm, Ottawa, in order to acquire experience in farming. In the February Gazette a report of the training work at Agassiz, B.C. was given and the following reports from different provinces indicate the trend of the work on the respective farms.

KENTVILLE, N.S.

BY W. S. BLAIR, SUPERINTENDENT

THE training work conducted by the Soldier Settlement Board at the Experimental Station, Kentville, has been under the direction of P. L. Sanford, and he has had placed at his disposal, by the superintendent of the station, teams, equipment, and materials necessary to carry on practical farm work.

One hour each day was given to lectures on agriculture by the officer in charge or some of the station staff. Three hours each day were given to live stock work including the milking, feeding, and managing of cattle and horses.

In addition to work in horticulture practical work in the management and care of farm crops, including

cultivating and harvesting of field crops, was undertaken.

An area of roots, corn, and hay was set apart for their management, and a field of 5 acres was given over to them for practical work in plowing, discing, and seeding.

Some thirty men availed themselves of this course during the past season.

The men were housed in a building erected on the picnic grounds at this station, with a suitable cook-house and dining room in an adjoining building.

This work was discontinued for the season on November 30th, and the majority of the men in training have secured places with farmers for the winter and will probably secure farms of their own next spring.

NAPPAN, N.S.

BY W. W. BAIRD, SUPERINTENDENT

AT this station we have not been doing any direct training of returned soldiers for work on the land, but indirectly we are, in that we have taken on during the past season eleven returned men for the major part of the summer. To these we have been paying from 25 to 27 cents an hour.

Out of the eleven there are six who have had considerable experience

on farms and are fairly good hands. The other five were not experienced, but we have been endeavouring to give them all the help and assistance we could, at the same time making them useful to us. Outside of this, we have not been doing any particular training work, but necessary arrangements can be made any time such men apply for training in farm work.

FREDERICTON, N.B.

BY W. W. HUBBARD, SUPERINTENDENT

PROVISION was made in April last for the establishment of a training class for returned soldiers who contemplated taking up farms in New Brunswick under the terms made possible through the Soldier Settlement Board.

One of the buildings at the Station was fitted up to provide sleeping and living accommodation for a class of twenty, and a superintendent of training was put in charge under the Soldier Settlement Board.

A twelve weeks course was designed during which each man would have a chance to learn the practical work of a farm, including live stock and dairy work, feeding, care and handling of a team, with practice in all field operations and manual work in crop growing and all departments of the farm. Carpentry and blacksmithing were also practised, and for those who wished it, opportunity for work with poultry and bees was given. All students who could not milk were given an opportunity to learn and practically all were taught to make butter and test milk.

Several lectures were given each week, covering the choosing of a farm, farm management, rotation of crops, the theory and practice of fertilizing, and cultivating land, drainage, and seed selection. The judging of live stock was also given some attention and discussions on care and feeding conducted. Special attention was given to the potato crop covering the selection, disinfection and cutting of the seed, planting, fertilizing, cultivation, and spraying, with a number of field lessons on the detection of disease in the growing crops.

The class and character of the men who took the course were surprisingly good; with but three exceptions, all showed great earnestness, industry, and perseverance in acquiring all the information and practice they could get. A few were

practically qualified when they came; others soon showed such adeptness that they were passed along as soon as they wished to go; while others were slower in getting into the swing of farm work.

The Soldier Settlement Board was fortunate in securing as superintendent an ex-service man who had a thorough training in the handling and control of men, and at the same time had a good practical knowledge of farm operations, and who was at all times glad to co-operate with the Farm management by putting his men where they could best advance the work in hand.

One of the most useful and pleasant features of the course was the formation of a debating society, which the Farm officials and employees also joined. Debating teams were chosen and judges appointed to score the addresses and give a decision, after which a social hour or two was spent with refreshments, music, and occasionally the fair sex were invited and a dance enjoyed. The expense of these evenings was made possible by a small assessment on the members of the society and placing the expenditure in the hands of a committee.

During the season from May 1st to November 1st thirty-five men in all passed through. Of these fourteen were passed as qualified to take up farms of their own. Seven of these qualified men are now settled on their own places, and two more are negotiating for their farms, and five have not yet moved in the matter of selecting a location. Fourteen men who had to take further training before being qualified are either now working with farmers or will do so next summer. One qualified man and one not yet qualified are taking a course at the Nova Scotia Agricultural College; one entered the employ of the Department of Agriculture as a poultry-

man, and only three were disqualified from taking further instruction, by reason of their inaptitude to agricultural work. Taken altogether,

the course was more successful than most of the men connected with experimental farm management thought would be possible.

LENNOXVILLE, QUEBEC

THE Experimental Farm has purchased and fitted up with permanent equipment such as buildings, fences, drainage, etc., where necessary, a farm of 150 acres for the training of returned soldiers for agricultural work. The farm in this condition has been handed over to the Soldier Settlement Board, who are taking charge of the training work as at points in other parts of Canada. The farm is stocked with horses, cattle, and other live stock, as well as the necessary implements and machinery for operating as a mixed farm including a considerable amount of dairying. The training given is of an elemen-

tary character and is intended for men who have not previously done agricultural work. About seventy men have already been trained at this farm and have been taught to milk, feed stock, groom and handle horses, and, in fact, learn to do all kinds of farm work. Mr. J. A. McClary, superintendent of the experimental station, gives assistance in the form of lectures and advice. When the Soldier Settlement Board is through with the farm as a training centre it will be handed back to the Experimental Farms System to become a portion of the Experimental Station at Lennoxville.

SUMMERLAND, B.C.

BY R. H. HELMER, SUPERINTENDENT

AS soon as the Land Settlement Board decided that inexperienced farmers should have some training before going on to the land, this station took up the work of engaging returned men who wanted to gain farm experience, in our case particularly in horticulture and irrigation. In February 1919 the first men came for special training. These men turned out so well, that at the end of their term we engaged them for the remainder of the season. One of these men has since gone to take up land near Creston; the other man is still with us. Off and on we have had other men taking courses and these men have been able, through the experience they have gained with us to take up land for themselves.

We are now building a boarding house to enable us to take care of from ten to fifteen returned men and

give them special instructions in farm work, especially under irrigation. Our method of procedure will be to classify these men under different heads, men with farm knowledge who wish to gain experience in irrigation practices, and men with no knowledge of farming whatever. The first group we hope to carry along in connection with our irrigation work; the men who have had no experience in farming we hope to educate in the simple farm principles and gradually work them up to where they can be carried along with group one. These men will be boarded at the expense of the farm and will repay us with work we are able to get from them.

All men who left this station to join the forces have been given the privilege of coming back and several have taken advantage of this.

BEE DIVISION

BEEES IN THE ORCHARD

ONE of the addresses given at the recent annual convention of the Fruit Growers of Nova Scotia at Kentville, was on the "Value of Bees in the Orchard," by F. W. L. Sladen, Apiarist of the Experimental Farms.

Mr. Sladen summarized the convincing evidence that insect visitors to the blossoms are necessary for the production of apples, and showed that honey bees are by far the best fitted of all insects for this work. He also gave reasons to show that the climatic conditions of Nova Scotia are such that the keeping of bees is more necessary there to insure the apple crop against failure in unfavourable seasons than in any of the other apple growing sections of the North American Continent.

A very heavy loss of honey bees was experienced in Nova Scotia in the hard winter of 1917-18, and the principal suggestion made in the address was that better care should be taken in preparing the bees for the winter, the necessary measures to be taken being explained at length under the headings of winter packing, and wholesome stores. The speaker referred to the favourable conditions in the Annapolis Valley for the multiplication of swarms and noted that the fastest rate of natural increase of bees he had ever observed was at the Experimental Farm at Kentville on July 13, 1915, when he found that a swarm that had been produced from a swarm of the current season was preparing to swarm again.

ENTOMOLOGICAL BRANCH

CHARLES GORDON HEWITT.

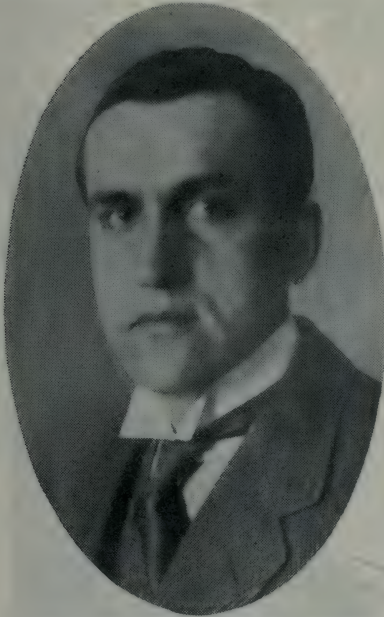
IT is with profound regret that we record the untimely death of Dr. C. Gordon Hewitt, Dominion Entomologist and Consulting Zoologist. Dr. Hewitt had attended the meetings of the Commission of Conservation on February 19 and 20, 1920, and immediately on his return to Ottawa was taken seriously ill with influenza. This soon developed into pneumonia and he died about 11 p.m. on February 29.

Dr. Hewitt was born at Macclesfield, England, on February 23rd, 1885, and had, therefore, just entered his thirty sixth year. He received his education in the Macclesfield Grammar School and Manchester University, which latter institution conferred upon him the degree of Doctor of Science. He was appointed Dominion Entomologist in 1909, the Division of Entomology at that time

being part of the Experimental Farms Branch. In 1914, the Division of Entomology was separated from the Farms and raised to the status of a Branch of the Department of Agriculture. In 1917, his title was changed to that of Dominion Entomologist and Consulting Zoologist.

During his eleven years of service an outstanding result of his whole work is the present firm foundation for the development of the federal entomological service. Just how well he accomplished this is instanced in the establishment of important Divisions at Ottawa, such as the Division of Field Crop and Garden Insects, the Division of Forest Insects, the Division of Systematic Entomology and the Division of Foreign Insect Pests Suppression, all under the immediate direction of highly qualified Chiefs. In addition,

special officers have been given charge of such investigations as Natural Control Investigations, Insecticide Investigations, and Stored Product Insect Investigations. In the various provinces too, field or regional laboratories have been established with trained entomologists in charge, who study local problems and disseminate information of value to agriculturists, horticulturists and others.



THE LATE DR. C. GORDON HEWITT
Dominion Entomologist and Con-
sulting Zoologist.

In 1909, he recognized the importance of legislation to prevent the introduction or spreading of insects, pests and diseases destructive to vegetation, and as a result Parliament passed the Destructive Insect and Pest Act in May, 1910. Under the regulations of this Act inspectors were appointed to deal with the threatened spread of the brown tail moth in the Maritime provinces, and provisions made for the prohibition, fumigation or inspection of nursery stock at definite ports of entry. In addition to the brown

tail scouting work which he developed in co-operation with the provinces of Nova Scotia and New Brunswick, he also arranged for the collection in Massachusetts and establishment in eastern Canada of thousands of parasitic and predaceous enemies of the brown tail and gipsy moths. Dr. Hewitt was keenly interested in medical entomology and accomplished much useful work on problems related to the house-fly, mosquitoes, ticks and other animals which spread disease.

PUBLICATIONS

He was the author of important books and memoirs. His chief published work is the well known book on the house-fly of which there were two editions. In addition a smaller book on the same subject appeared as one of the Cambridge Manuals of Science and Literature. His departmental publications consist of a series of annual reports (1910-1916)* and bulletins chief among the latter of which are the Honey Bee and the Large Larch Sawfly. Just recently he completed an important work on the "Conservation of the Wild Life of Canada," the manuscript for which is now ready for the press. The publication in 1919 of the various parts of an important volume on the insects collected by the Canadian Arctic Expedition, 1913-1918, was brought about under his direction.

HONOURS CONFERRED

Dr. Hewitt's reputation was by no means confined to Canada. In addition to a wide connection among scientific workers in England, his outstanding abilities were soon recognized by entomologists in the United States, where economic entomology particularly has reached such a high development. In the year 1913, he was honoured by being elected a Fellow of the Entomological Society of America. In 1915, he was

* 1917-1918, now in press.

elected president of the American Association of Economic Entomologists. In Canada, in 1913, he accepted the presidency of the Entomological Society of Ontario and in the same year was elected a Fellow of the Royal Society of Canada. In the following year he was appointed honorary treasurer of the latter society, which office he held at the time of his death. He was a Fellow of the Entomological Society of London (England), and was Honorary Fellow of the Royal Society for the protection of Birds (London, England.) He was a recognized student of wild life preservation and rendered valued service in the capacity of secretary of the Advisory

Board on Wild Life Protection.

The gold medal of the Royal Society for the Protection of Birds was presented to Dr. Hewitt in grateful recognition of successful efforts in furthering the Treaty between Canada and the United States for the protection of migratory birds. To secure the assent of Canada to the Treaty he made an extensive tour through the Dominion and thus obtained, by his practical and scientific knowledge, the necessary sanction of every province.

In Dr. Hewitt's death Canada has sustained a serious loss, and it is indeed deplorable that a life full of such great promise should have been prematurely ended.

THE OUTBREAK OF LOCUSTS IN WESTERN CANADA IN 1919

THE outbreak of locusts which occurred in certain sections of Manitoba, Saskatchewan, Alberta and British Columbia in 1919,

opened as an agricultural region, although the serious losses were confined to certain districts.

As soon as it was realized from the



STRIP OF WHEAT FIELD, BORDERING ON A ROAD ALLOWANCE, PRACTICALLY EATEN BARE BY HOPPERS.

was the most important from an economic viewpoint that has been experienced since the West was devel-

oped as an agricultural region, although the serious losses were confined to certain districts. As soon as it was realized from the unusual emergence of young hoppers that the outbreak of locusts was likely to have serious effects, immed-

iate steps were taken to warn farmers and to advise them as to control measures. The press willingly co-operated throughout the season's campaign in publicity work. The federal and provincial Departments co-operated in the control work, which included determining the infested areas, holding meetings of farmers, demonstrating the use and value of the poison baits, and later in the season the new areas in which eggs had been deposited were determined.

gations of the areas in which the migrating adults of last season deposited their eggs lead us to expect that the infestation of 1920 will cover about twice the area of that of 1919.

MANITOBA

In Manitoba the outbreak of locusts was chiefly confined to the south-west corner of the province. The federal and provincial officials co-operated in visiting the affected areas where instructions



HOPPERDOZER MADE OF GALVANIZED IRON

The difficulties of dealing with the outbreak were enhanced by the fact that the outbreaks were most severe in districts affected by the extreme drought. Consequently it was difficult to persuade many of the farmers who were discouraged by these losses to undertake control work. The demonstrated value of the poisoned bait, however, convinced the majority that the securing of a crop depended on its use, and as a result of the widespread application of poisoned bait and the use of hopperdozers thousands of acres were saved.

Unless unfavourable weather conditions prevail during the coming spring and affect the emergence or growth of the young hoppers investi-

in control methods and demonstrations were given to the farmers. The Manitoba Department of Agriculture distributed free poison, which did much towards saving the crop. The municipal authorities were also quick to take action in the matter and were soon supplying most of the bran and attractants used as baits, besides, in some instances, actually mixing the ingredients at a central point.

SASKATCHEWAN

In Saskatchewan the branch of the Weeds and Seed Commissioner co-operated with the federal officer of the Entomological

Branch. The area affected extended from the Manitoba and the United States boundaries in the south-east part of the province and followed a north-westerly direction to the vicinity of Saskatoon. The infestation was by no means uniform in intensity, it being more severe on the lighter soils.

As a result of control measures it is estimated that upwards of 800,000 bushels of wheat worth \$2.50 a bushel were saved.

In Saskatchewan as in Manitoba the provincial government furnished to the farmers, through the medium of the various municipal councils, Paris green and other poisons. Municipalities also supplied free of charge the remaining ingredients of the poisoned bait, which consisted of bran, molasses, and lemons or oranges. There was made up and used in this province 226 tons of poisoned bait, costing in the neighborhood of \$35,000.

ALBERTA

The infested area in Alberta covered about 2,500 square miles in southern Alberta and about 500 square miles in the Indian reservation.

Owing to the seriousness of the drought it was impossible to estimate the destruction caused by the locusts. Control work was therefore of little avail.

BRITISH COLUMBIA

The outbreak in British Columbia was distributed over four widely separated districts. First, in the boundary country between Bridesville and Rock Creek; second, on Shuswap Lake at Celesta; third, in the Chilcotin district, particularly on the Riske Creek range; and fourth, in the Lower Fraser Valley at Huntington. The drought conditions over some of the infested areas made it impossible to estimate with any degree of accuracy the damage done by the locusts.

SEED BRANCH

THE CANADIAN GOVERNMENT SEED PURCHASING COMMISSION

BY G. H. CLARK, B.S.A., SEED COMMISSIONER

THE Canadian Government Seed Purchasing Commission which has been considered as a wartime organization under the Branch of the Seed Commissioner, has continued in operation this season in an endeavour to take care of the emergency seed situation in the Prairie Provinces. In former years the Commission also merchandized seed grain from the Canadian Government Elevators at Port Arthur, Quebec and Montreal. It is anticipated, however, that private grain and seed firms together with the farmers' co-operative organizations, are now capable of rendering efficient service in respect to the seed situation in Eastern Canada. Seed inspection for the estab-

lished grades of seed grain continues to be available at Canadian Government Elevators to private and co-operative dealers on precisely the same basis as to the Seed Purchasing Commission.

Under normal conditions of trade the Canadian people might not accept the viewpoint that merchandizing is a proper function of government. It is contended by some that private companies have not in past years provided a service in respect to seed supply, sufficiently comprehensive to meet the requirements of agriculture. Semi-public organizations of farmers with a co-operative basis have developed rapidly under the extraordinary conditions of wartime trade. When

these organizations become firmly stabilized, they will doubtless under government assistance and control be able to provide seed supplies more efficiently and with greater satisfaction than can be expected of any governmental organization. Even now the distribution of seed grain and other seeds is substantially effected and prices controlled by farmer's co-operative organizations.

The Seed Purchasing Commission has without doubt given valuable service to agriculture during the trying years of the war, when notwithstanding extraordinary conditions both in regard to seed supply and transportation, there was at no time a seed shortage in any part of Canada. Obligations and business risks which appeared to be necessary to prevent short seed supplies were frequently assumed by the Commission as a protection to agriculture. This course of action could not be expected of private companies, and naturally resulted in losses in connection with several minor transactions. The consolidated balance sheet, however, covering the operations of the Seed Purchasing Commission for the past three years shows a small surplus.

The total sums advanced by the Department of Finance for the purchase of seed supplies, on requisition for the Dominion Seed Commissioner, amounted to \$11,896,540.96; and the total of refunds to the Receiver-General from the proceeds of sales was \$11,903,437.76. Net assets including seed grain in storage were valued at \$37,888.85. The salaries and expenses

of the experienced Seed Branch officers comprising the staff of the Commissioner were not charged against the cost of the seed. The Order in Council which established the Seed Purchasing Commission directed that the seed supplies should be purchased, stored, cleaned, sacked where necessary, and sold at the net cost as nearly as might be determined.

The business of the Commission covers the period beginning October, 1916, and ending September, 1919. It includes the purchase and sale of seed wheat, oats, barley, rye, corn, peas and beans, subject always to inspection as to the established grades for seed grain which were provided under the Seed Control Act. Inspection was administered by the Seed Inspection Division of the Seed Branch. Every car lot of seed purchased or sold was examined by seed inspectors, and samples were submitted for tests as to purity and germination by the Dominion Seed Laboratories at Ottawa, Winnipeg or Calgary. Delivery consisted of bill of lading, licensed weighman's certificate, seed certificate and sight draft.

This system of meeting emergency seed situations was adopted on the recommendation of the Seed Commissioner. It is based on the establishment of official seed grades for grain, and on the principle that municipal governing bodies supported by their provincial government are in the best position to deal with the extension of credits to needy farmers.

PART II

Provincial Government Departments

DEMONSTRATION ORCHARDS.

In four provinces of the Dominion orchard demonstration work has been carried on over a period of years. Each of these provinces has its own system and method for conducting these orchards and the following four articles give an idea of the plans adopted and the successes achieved in each.

NOVA SCOTIA

ORCHARD DEMONSTRATION WORK

BY P. J. SHAW, TRURO

THE orchard demonstration work carried on by the Horticultural Division of the provincial Department of Agriculture in Nova Scotia is of two kinds. One kind deals with orchards planted and cared for from the start under the direction of the Division of Horticulture, the other with full-grown orchards which had been planted and were grown up and were allowed by their owners to be used for demonstration purposes. The orchards of the first group, called model orchards, numbering 35, were planted between the years 1901 and 1911. They are distributed over the province, generally two in a county, situated outside the fruit district proper, although some of them are in localities as well suited to the growth of the tree fruits as most parts of the Annapolis Valley. These orchards were planted (1) to find out the possibilities for fruit growing in the non-fruit growing parts of the province; (2) to find out what varieties are best suited to these sections; (3) to give a demonstration of what are considered the best methods of planting and caring for orchards. In size they are each about two acres, although some are only one acre.

The province of Nova Scotia extends in a north-easterly and south-westerly direction between the 43rd and 47th parallels of north

latitude. The area which is naturally best adapted to the growth of the tree fruits is in the western part of the province and crossed by the 45th parallel of north latitude. A considerable difference of climate is found in the province, even in short distances. For instance, peach trees grow and bear fruit at Windsor, while 58 miles away, at Truro, this fruit will not live through the first winter. Probably it is because of the favorable climate that apple growing is the most important branch of farming in the Annapolis Valley. It is only of minor importance in most of the rest of the province.

GROWING FOR LOCAL MARKETS

The question arose: Can the tree fruits be grown for home use in all parts of Nova Scotia? and can they not be grown to some extent for the local markets in the most favorable sections of the present non-fruit growing parts of the province? It was to answer these questions and to give encouragement to fruit growing in promising sections that the work of the Department of Agriculture was undertaken and carried on, not to try to develop commercial fruit growing in all parts of the province.

As might be expected, the efforts to grow tree fruits under the varying

conditions of soil and climate found in Nova Scotia have been attended with varying results. In some places the orchards have succeeded admirably, in others not as well, while in still others, from the point of view of the owners, they have been failures though not from the point of view of the Department of Agriculture. In the latter cases, the causes of failure are being studied and, as far as possible, removed, already in some instances with evidences of success.

MODEL ORCHARDS

In the case of the model orchards, where the Department of Agriculture assists in the planting and the growing of the orchard from the start, an agreement is made with each owner that he is to furnish the land, the labor and the manure necessary to carry on a model orchard, and to do the work according to the directions of the Professor of Horticulture at the Agricultural College, Truro. The Department of Agriculture agrees to furnish the nursery stock necessary for planting the orchard and to replace all trees which die from causes other than the neglect of the owner. When the work is carried on satisfactorily by the owner the Department agrees to furnish fertilizers and also tile for underdraining, where necessary. The fruit of the orchard is the property of the owner from the beginning.

Nova Scotia has not had a large crop of apples since 1912. Up to that year the largest crops in the history of the province were in 1911 and in 1912. Since then, due probably to unfavorable weather conditions the crops have been light, at least in all except the most favorable locations. The result has been that the yields in the model orchards for the period from 1912 to 1918 have been smaller than they would otherwise have been. In 1919 the crop has been better than for several years, as it has been in general throughout the province this year.

The following figures show the yields of six model orchards which gave the best crops this year.

Orchard at Falkland Ridge, Anna. Co., set out 1901, 186 bbls.

Orchard at Bridgewater, Lunenburg Co., set out 1904, 150 bbls.

Orchard at Deerfield, Yarmouth Co., set out 1902, 103 bbls.

Orchard at Gore, Hants Co. set out 1903, 100 bbls.

Orchard at Lochaber, Antigonish Co., set out 1904, 90 bbls.

Orchard at West Bay, Cape Breton, (1 acre) 1902, 55 bbls.

VARIETIES

In the model orchards in western Nova Scotia the standard commercial varieties of the fruit district do well. Examples of these are Gravenstein, Blenheim, Ribston, King, Baldwin, Golden Russet, Fallawater, Spy and Ben Davis. In eastern and northern Nova Scotia, except in the most favored localities, a different selection of varieties has to be made. The varieties just named are too tender to thrive in the other parts of the province and do not reach proper maturity there. The varieties which have been found most successful and the safest to recommend here are mostly early maturing kinds, such as the following: Crimson Beauty, Yellow Transparent, Astrachan, Duchess, Wealthy, Dudley, Alexander, McIntosh Red, and Bethel. Wolfe River has been found particularly hardy and resistant to disease in the most trying situations. This might possibly point to its value as a stock on which to top work other varieties.

Naturally, in 35 orchards set throughout the province, some orchard owners would be found less painstaking than others. In some instances orchard owners have died or have sold their properties and have been succeeded by persons having less interest in fruit growing, or persons with less financial ability, or by women. In other cases city people

have come into possession of these orchards. These interruptions in the management have interfered to some extent with the continuation of the work. The personal equation in the management perhaps counts for as much as all the rest in the successful carrying on of an orchard. Sometimes orchard sites have proven to be unfavorable, sometimes the soil has been too wet or the sub-soil impervious. It has been found necessary in one instance, where an orchard failed on a poor site to move to a better piece of ground. Under-drainage in other orchards has produced a decidedly beneficial effect.

RENOVATION OF OLD ORCHARDS

In 1914 the Division of Horticulture undertook some work in orchard renovation with several orchards of bearing age, situated in different parts of the province, but mostly outside the fruit district.

An agreement with each of eight orchard owners was made for a period of five years to the effect that the owner was to allow his orchard to be used for demonstration purposes and that he was to provide the labor and the manure necessary for the proper care of the orchard. The Department of Agriculture agreed to furnish fertilizers, spray outfits, spray materials and directions for the care of the orchards. The fruit was to be the property of the owner throughout the period of the agreement.

The object was to see what improvement could be made in the general health of the trees, in their growth and the yields of fruit, by giving them proper treatment as to cultivation, fertilization, pruning, and spraying. In some cases, undesir-

able varieties were grafted out. Some of the orchards had been more or less neglected showing the results of this neglect in the shaggy bark of the trunks and larger limbs, in the moss covered twigs and branches and stunted twig growth as well as in poor yields of fruit. The trees were first thoroughly pruned, all the diseased and dead wood being removed as completely as possible. The trunks and larger limbs were scraped to remove the rough bark which sheltered the hibernating and scale insects. The trees were then given a dormant spray of lime-sulphur and later in the season three summer sprays of the same mixture. The ground was plowed late in the fall or in early spring, and given the usual tillage through May and June. Cover crops were grown. The orchards were fertilized with acid phosphate, 400 pounds per acre and nitrate of soda 200 pounds. At the beginning of the operations muriate of potash was used at the rate of 200 pounds per acre, but after the first season this fertilizer was no longer available.

The result of this treatment carried on for a few years has been to greatly improve the health, appearance, and growth of the trees in these orchards and the yield of fruit as well. As an example of the effect on the yield Mr. D. M. Brown, Pughwash, N. S., reported in 1917, a yield of 50 barrels of apples in his demonstration orchard, in 1918, 90 barrels and in 1919, 200 barrels. In some places a further effect of this orchard demonstration work has been to increase the interest of neighbours of the orchard owners and to encourage them to take better care of their orchards and to plant more fruit trees.

NEW BRUNSWICK

OBJECTS AND WORK OF THE DEMONSTRATION ORCHARDS

BY A. G. TURNEY, PROVINCIAL HORTICULTURIST

DEMONSTRATION orchard work in this province was first undertaken in 1911, when the Department arranged for the operation, for a three-year period, of

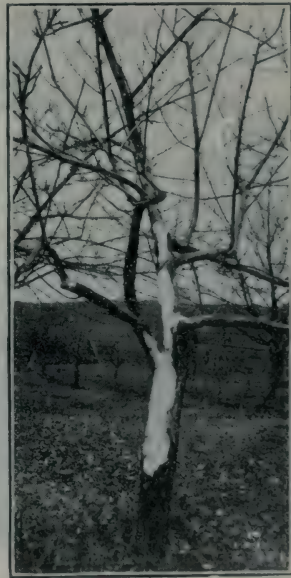


AN UNTREATED SUN-SCALD AND
CANKER-WOUND ON AN
APPLE TREE.

parts of the orchards belonging to Joseph Hawkins, Douglas, York county; J. W. Clark, Maugerville, Sunbury county, and H. L. Steeves, Lower Coverdale, Albert county. Other orchards taken over for similar operation were those of C. R. McKenzie, Lingley, Kings county, in 1912; University of St. Joseph's College, Westmorland county, in 1913; O. F. Corey, Havelock, Kings county, and J. R. Randall, Randall's Corner, Sunbury county, in 1914; and William Coburn, Keswick Ridge, York county, in 1916.

Descriptions of these orchards, records of the work done in them and the results obtained were published in my annual reports for the years of their operation and are

available to interested parties. The operation of these demonstration orchards gave us some much needed data as to costs of production and yields and profits per acre and proved of distinct value in demonstrating the province's possibilities in commercial apple growing and in encouraging new plantings on a larger scale. Their object accomplished, we have, for the time being, discontinued that type of demonstration orchard in favour of types of orchards planted by ourselves with the object of ascertaining the most economical methods of growing varieties of proved adaptability and commercial worth in this province.



SUN-SCALD AND CANKER-WOUND
AFTER PROPER TREATMENT.

SELECTING SUITABLE VARIETIES

The work of the old style or bearing demonstration orchards established clearly that our leading varieties of apples, those on which the

immediate or first extension of the industry would have to be based, are Wealthy, Alexander, Fameuse and the McIntosh (with McIntosh preferred to Fameuse), with a smaller place allotted to Duchess and Dudley and to some winter varieties that may be profitably grown in

the object being to ascertain more concerning the comparative behaviour and worth of Fameuse and McIntosh in different sections and the Alexander being included for its pollenizing value. Three of these orchards were established in Queens county, two in Kings county and one



GENERAL VIEW OF A DEMONSTRATION ORCHARD AFTER SPRAYING WITH LIME WASH.

particular sections. Given, therefore, these four varieties of proved worth and adaptability, the obvious thing to do is to exploit their production in the very best sense of the word—to demonstrate as widely as possible their superiority over other varieties for our conditions,

each in the counties of Carleton, Sunbury, York and Westmorland.

In the spring of 1919, seven more and larger orchards of these varieties, including Wealthy, in various combinations and planting distances, were set out and are as follows:— Three orchards, each consisting of



VIEW OF DEMONSTRATION ORCHARD SHOWING A PUBLICITY SCHEME USED IN NEW BRUNSWICK.

and to ascertain and demonstrate the best and most economical methods of producing them.

In 1918, we established nine new test or demonstration orchards, each consisting of about an equal number of Fameuse, McIntosh and Alexander, planted thirty feet apart each way,

50 Wealthy and 50 Dudley, planted fifteen feet apart with a thirty-foot roadway, separating the block of Dudley from the Wealthy; one orchard consisting of 68 Dudley and 80 Wealthy, planted $12\frac{1}{2}$ feet apart with a thirty-foot roadway, separating the blocks; one orchard consist-

ing of 75 Dudley and 75 Wealthy, planted 10 feet apart; two orchards, each consisting of 108 trees per acre—standard trees planted forty feet apart square with one in the centre of each square, giving 39 standard McIntosh and 15 standard Alexander, with fillers twenty feet each way, 27 Wealthy and 27 McIntosh.

The object of the Dudley and Wealthy orchards is to find out if the most economical way of growing these shorter lived and smaller tree varieties is by closer planting in separate blocks, rather than at wider distance among lar-

ger growing or standard trees, such as McIntosh and Alexander, and, at the same time, to compare the Dudley with the Wealthy in this respect.

These new commercial demonstration orchards, as they will be known, have been placed with leading growers so that the conditions of care and culture are the best obtainable. Accurate and detailed records of the cost of growing, yields, etc., will be kept and published, and these orchards will be pruned and their care supervised by the Horticultural Division.

QUEBEC

HOW FRUIT CULTURE IS BEING DEVELOPED

BY J. H. LAVOIE, CHIEF, HORTICULTURE DIVISION

AFTER a long period of successful experiments on the acclimatization of imported fruit trees, there was a time when the fruit industry had made such progress

These checks, caused by adverse influences, arising from various factors, meteorological, climatological, geological, technical and economical, influencing production, are now being



A WELL KEPT DEMONSTRATION ORCHARD IN QUEBEC

These properly conducted demonstration orchards are valuable object lessons to the neighbouring growers who see the results of clean cultivation, proper pruning, and timely spraying.

in our province that the brightest hopes were entertained for its future.

These bright prospects, however, have not been realized, and during the last ten years fruit culture has suffered successive checks, greatly retarding its growth.

investigated by us, and the best and most efficient means of preventing the same are being taught.

On account of this multiplicity of contrary factors creating perplexity among producers and discouraging beginners, the main object of our

work must be to demonstrate in a tangible manner the fact that by following our suggestions regarding preventive measures, good methods of management and marketing, the producers will not only overcome the difficulties which can be vanquished, but also reap substantial profits.

This is why since 1909 an endeavour has been made to establish demonstration orchards in fruit producing centres and also in other districts where the conditions of soil, climate

They are established on well exposed sites and on good soil, within proximity of best driving routes, and their owners agree by contract to do all the work planned by our instructors, and follow their instructions.

RESULTS.

The results so far obtained from these demonstration orchards, most of which were neglected at the beginning, if not completely abandoned to themselves, are sufficient to con-



TRIMMING, INSPECTING, AND WRAPPING NURSERY STOCK BY QUEBEC POMOLOGICAL INSTRUCTORS

and markets are favourable; such orchards to be managed in a commercial way under our supervision, and under methods recommended by the pomological authorities of this province.

These demonstration orchards, now numbering 103, (38 for large fruit trees and 65 for small fruit) are provided at our expense with everything necessary for their establishment and maintenance: trees, shrubs, manures, fertilizers, pruning, grafting, spraying material, etc.

vince the neighbouring fruit growers of the efficiency of our methods and of the possibility of making good profits out of well managed fruit culture.

In spite of the high cost of labour, packing material and transport, and in spite of the losses incurred through the hardships of the winter of 1917-18 and the unfavourable temperature of the growing seasons of 1918 and 1919, the average balance sheet of our demonstration orchards in the district of Montreal for these two years is as follows:—

Average area— $4\frac{3}{8}$ acres.

Average cost of pruning.....	\$ 16 30
“ fertilizers.....	27 50
“ spraying.....	42 91
“ soil cultivation.....	13 87
“ harvesting.....	483 58
Total expenses.....	\$ 584 16
Gross receipts.....	2,231 25
Net receipts.....	1,646 09
Net receipts per acre.....	357 84

Such figures should encourage fruit growers to think, and make comparisons. However, progress in fruit culture is comparatively slow much as in general agriculture, and our assistance in various ways is necessary to stimulate this progress. As an instance of our activity, it may be stated that in order to encourage the planting of fruit trees, over 90,000 fruit trees were secured and sold at low prices to the members of our associations during the last three years. These trees were inspected before shipping by our inspectors for quality, variety, pruning and packing, and their planting on the farm was also done under the supervision of our inspectors.

FURTHER DEPARTMENTAL ASSISTANCE.

Help is also given to the secretaries of our associations desiring to secure at reduced prices material required for spraying.

Educational propaganda also takes a great deal of our time. A demonstration field has been established at each of our normal schools, where future teachers may acquire, by practical work, elementary knowledge of fruit, vegetable and flower culture, which they may later impart to their pupils.

During the last two years, over 6,000 fruit trees have been distributed, as premiums, to the pupils of rural schools, to turn their thoughts towards fruit growing.

A provincial fruit tree nursery is now being established in order to increase this distribution.

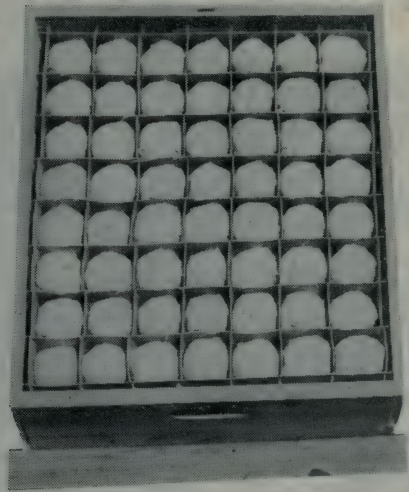
A great number of lectures, demonstrations and visits have been made

throughout the province by our instructors, the total of which numbers 7,571 for last year.

Such is a brief summary of the work done and which we intend to do to improve fruit culture.

NEW MARKETS.

But government intervention must not be limited to this. To encourage the producer to produce more and better products is not sufficient. Profitable markets must also be provided.



HIGH GRADE APPLES SEPARATELY WRAPPED
AND PACKED IN CARTONS

To this end an endeavour has been made lately to introduce our choicest fruits on the European markets.

A consignment of 150 boxes of choice Fameuse and McIntosh apples coming from our demonstration orchards and packed as shown

in illustration, was shipped to the owners of the leading Parisian restaurants and the numerous requests that have since been received lead us to presume that our producers may find a very profitable market for their apples, and specially the McIntosh, providing however, that they ship only choice fruits and improve the packing.

In order to attain this aim, we are now endeavouring, in co-operation with the Pomological Society, to so organize our best producers that they will ship to foreign markets only the choicest fruits the quality, grading and packing of which will be controlled by an inspector, and to be

sold under the same trade mark.

The cost of making the cuts (in three colours) for the printing of these trade marks will be paid by the Department and each grower will have to pay only the cost of printing for the number of copies needed for his parcels.

With such facilities provided to the growers in our large fruit growing centres, in addition to the free use of a cold storage and grading machines it is hoped that fruit culture and the fruit industry will, in our province, make the degree of development which may be expected from the natural advantages of our soil and climate.

ONTARIO

LESSONS LEARNED FROM DEMONSTRATION ORCHARDS

BY W. F. KYDD, FRUIT BRANCH

FIVE leased orchards in the counties of Simcoe, Norfolk, Prince Edward, Lambton and

Ontario, all being in apple growing sections, were looked after by the Ontario Department of Agriculture



OLD HIGH APPLE TREE, SHOWING METHOD OF HEADING BACK

during the war. Four of these have been very profitable. In the Prince Edward county orchard it was successfully demonstrated that new heads could be put on old trees.

The Department found that leasing apple orchards is a profitable business, but several things must be done to make it so. On the lighter soils many of the trees are positively starving while on heavier lands this may not be so apparent. In the

tree and the total cost is \$21 per acre. The amount looks big but there is no doubt that it will pay well to spread that much on light land nearly every year.

CULTIVATION TESTS

About six or seven years ago we began ploughing, in the fall, several rows of trees in all the leased orchards (a portion being left in sod to test



A BALDWIN TREE AFTER PRUNING OUT SURPLUS WOOD.

experiments very little commercial fertilizer was used, but the Department depended on the use of barnyard manure, mostly secured from Toronto, which at present costs \$1.50 per ton f.o.b. Toronto. The freight to Simcoe is 90 cents per ton, the hauling from railroad siding to orchards brings the final price to over \$3 per ton. About seven tons per acre is sufficient for one application which gives about 400 pounds per

the sod mulch). This was done in order that we could answer from experience the frequent question—What about fall ploughing? When the land is fall ploughed cultivation can be begun much earlier in the spring. It costs much less to get land in good condition when it has been ploughed before winter but we can see no advantage in ploughing closer than five feet from the tree. The troublesome part in

orchard cultivation is close to the trunk and it is frequently difficult to work near the tree without injuring the bark.

We have tested cultivation against sod mulch and have concluded that nearly all the orchards will be more profitable when cultivation is carried on, unless the land is first class and there is plenty of barn-yard manure for mulching. When to stop cultivation is rather hard to answer. It depends on the season. The drier the weather the later the cultivation should be carried on. On rich land apples will grow long after cultivation has ceased. We are stopping our cultivation earlier and earlier every year because our Ontario apples lack colour; less cultivation means more colour, more colour higher priced fruit. Medium apples slightly coloured seem preferable to larger ones lacking colour. When cultivation is stopped a cover crop is frequently sown. The principal object being to rob the trees of nourishment in order that the fruit will colour and the wood will

ripen before winter. Some low growing crop from cheap seed gives most satisfaction.

PRUNING AND SPRAYING

Trees must be pruned to get high class apples. The best time to prune is early spring but we prune any month when the weather is not too cold for our men. If there are large cuts to make we leave a stub about one foot long and cut it off in the spring as cuts of two inches or more do not heal well when made in the very cold weather; large cuts should be kept painted to keep the wood from decaying. Pruning is a slow business and costs a lot to get a big orchard done but it is absolutely necessary if good apples are expected. High trees are difficult to spray thoroughly. Twenty feet is high enough for any tree and several feet of top may be removed in a season with no bad effects. The tree with a low head is easier pruned, easier sprayed, can be picked for half the cost, and the wind will not blow down so many apples.

WOMEN'S INSTITUTES

While the functions of the women's institutes and the work performed by them are practically the same in all parts of Canada, the organization and system of administration in the different provinces are not uniform. In order that the systems that obtain in the different provinces may be studied side by side, and to bring out the magnitude of the movement in each province, there have been brought together, in the following articles, the statements of the provincial officers who are responsible for directing the work. The work of these organizations in all of the provinces except British Columbia is assisted, to some extent, by funds provided under *The Agricultural Instruction Act*.

PRINCE EDWARD ISLAND

MISS DELLA E. SAUNDERS, SUPERVISOR

AT present there are 34 institutes active in Prince Edward Island, with a total membership of 750. These societies are scattered over the whole island and comprise but one district. A supervisor and an assistant have charge of the work, their duties being as follows:—

1. To organize institutes and to visit all the societies at least once during the year.

2. To give assistance and direction to each institute in all matters pertaining to the work as may be deemed helpful.

3. To give addresses and demonstrations, etc., as may be arranged.

4. To audit the books of the secretary-treasurer of each institute.

5. To judge the household science exhibits at the school fairs and exhibitions.

6. To conduct a series of household science short courses, during the winter months, for the benefit of the girls and women from the rural sections of the province.

7. To teach cooking to the pupils of the Charlottetown public schools. Eight classes a week receive instruction.

All members of the women's institutes of Prince Edward Island pay an annual membership fee of 25 cents, which remains with, and is for the use of, the institute collecting the same.

The provincial government gives annually a grant of \$5.00 to each institute. This money goes into the general funds of the respective soci-

eties and may be used in whatever way the members choose.

There is but one convention held during the year and usually representatives are present from every institute. Each society elects two delegates and the railway fares of these are paid by the government. The board of the delegates while in town is paid by the institutes which they represent. All conventions are held in Charlottetown.

The women's institutes of Prince Edward Island have not, as yet, joined the Federation of Women's Institutes. There is no doubt, however, but that they will do so in the near future.

NOVA SCOTIA

BY MISS HELEN J. MACDOUGALL, SUPERINTENDENT

Late in the summer of 1913 women's institutes were introduced into Nova Scotia and fourteen branches were organized during the first year. The number has gradually increased until we have now fifty-five active branches with a membership of nearly 17,000. During the greater part of the first year the province was without a superintendent and there was no one to assist the branches consequently the work then did not progress to any extent. As yet we have no provincial organization but at the next annual convention plans for the same will be brought forward and discussed.

The supervision and work are under the charge of the superintendent whose duties are, first, to keep in touch with all of the societies by correspondence and by visiting them as frequently as possible; second, to send out information and assistance for planning programmes, conducting meetings, etc.; third, to provide information regarding home economic subjects; fourth, to keep the institutes in touch with the work of the organization; fifth, to plan short courses

and lectures on home economic subjects, and to send out instructors and demonstrators to conduct the same.

The membership fee is 25c. which amount goes into the treasury of the institute. The government grant is \$5.00 per institute irrespective of the number of members, the only stipulation being that the grant shall be expended in such a way that all members may receive equal benefit therefrom. The Department of Agriculture provides the McGill travelling library free of charge to all institutes desiring them.

The annual convention is usually held in June at the Agricultural college, Truro, N.S., and each branch is entitled to send two delegates. The Department contributes one-half railway fare of one delegate from each institute besides an allowance of \$1.00 per day for expenses while in Truro. Accommodation for the delegates is provided for them during their stay.

Representatives for the Federation of Women's Institutes are elected in open meeting, nominations being handed to a nominating committee

and the selection is made by ballot.

Nova Scotia has no official organ for the women's institutes. News of the institutes is published in the daily newspapers and articles regarding them are published frequently in *The Agricultural Gazette* and other agricultural magazines.

The study of health problems is a live subject and a series of lectures in home nursing is now in progress in the province—systematic instruc-

tion which will give the diligent student a certificate of recognized standing. Local improvements such as community halls, etc., are undertaken by many of the institutes, and the welfare of the school is a matter of first consideration.

Always they keep before them their motto "For Home and Country" and in their work they strive to consider both household and community problems.

NEW BRUNSWICK

BY MISS HAZEL MCCAIN, DIRECTOR

THERE are 134 branches of the women's institutes in New Brunswick with an approximate enrolment of 5,000 members. The provincial organization is not yet completed but a provisional advisory board will act until the regular board is elected by the provincial convention.

The provincial director outlines and makes all arrangements necessary for short courses, and household science which constitute the winter campaign; makes arrangements for demonstrators and lecturers who are sent out by the Department to the branch institutes; compiles institute bulletins; addresses institutes; attends to all institute correspondence coming into the Department and conducts general supervision of of the work throughout the province. The time, place and programme of the provincial convention is arranged by the director.

In addition to the annual membership fee of 25 cents which is retained by the branch, a grant of \$5 per year is paid, by the Department of Agriculture, to each institute complying with the rules and regulations of the organization. While it is in order for the institute to use the government grant or membership fees in

subscribing to several magazines to which all members have access this part of the institute's funds should not be used in giving each member a magazine subscription.

Each branch institute elects and bears the expenses of one delegate, who shall be known as the 'official delegate,' to the provincial convention, except in the case of institutes organized during the current year when such expenses will be borne by the Department of Agriculture.

New Brunswick has yet only such standing committees as were brought into being by the federation of women's institutes of Canada. Conveners of such committees are chosen by the supervisor, consideration being given to experience, efficiency, and representation of all parts of the province. The representatives of the women's institute federation, other than the government official, were chosen by the director, and their appointments ratified by the provincial convention. Hereafter such representatives will be elected by provincial election. The publicity for the institutes of New Brunswick is conducted through local news papers and through the home department of the "Maritime Farmer" which is published at Sussex, N.B.

QUEBEC

BY MISS M. MAY CHUTE, SUPERINTENDENT

THE history of homemakers' clubs, as compared with similar organizations of the other provinces of the Dominion, is unique, inasmuch as the women of Quebec, unassisted by the government began this work themselves. The first organization of this kind was formed at Dunham in Missisquoi county in January, 1911, through the efforts of a few women of the county, who formed an executive for the purpose of carrying on this work. This movement has grown until there are now clubs in thirteen counties—fifty homemakers' clubs and four girls' clubs, with a total membership of one thousand and ninety.

The work of the clubs is under the direction of the extension department, school of household science, Macdonald College; the members of the staff devote their time to organizing and developing the work of these societies.

A provincial executive composed of president, two vice-presidents, secretary, treasurer and the conveners of provincial standing committees, meet at least once a year to discuss matters affecting the work throughout the province, and formulate and submit resolutions at the annual convention.

A county executive composed of president, secretary, treasurer and representatives from each club (the number depending on the membership of the club), directs and assists in extending the work in the county.

The provincial director, known as the Superintendent of Homemakers' Clubs, plans and organizes work for the clubs, organizes new clubs, visits clubs at least once a year, lectures, superintends the annual convention, answers letters and sends out all information asked for by club members.

According to the constitution, "the annual fee shall not be less than

twenty-five cents and not more than fifty. The clubs of each county shall decide their own membership fee." Twenty-five cents is the fee at present adopted by the majority of counties. One-third of the fees is given to the county executives to help in carrying on the work of this organization. The officers and members of each club have full control of the balance.

The provincial government prints the handbooks and reports. For the past two years it has given a special grant of ten dollars to each county executive with the proviso this year that each county has a membership of at least twenty-five. This sum is used at the discretion of the executive.

An annual convention is held at Macdonald College each year, in the month of June. Each county executive appoints one delegate, that delegate being the president, and pays her railway fare. Each club appoints one official delegate and two visiting delegates and pays the railway fare of the official delegate. All delegates are entertained at Macdonald College while at the convention.

Standing committees were appointed at the last annual convention to look into the questions of child welfare, education and better schools, household science, immigration, legislature and publicity. The conveners of these committees form a part of like committees in the Federated Women's Institutes. Our committees are working in a quiet way, finding out the attitude of this province on the above questions, and getting a report with recommendations ready for the next convention.

At a conference of representatives of the "cercles de fermieres" and the "homemakers' clubs" held last April, it was resolved that the following recommendation be made to the clubs at their annual convention—that the presidents of the provincial organizations of the "cercles de fermieres"

and "homemakers' clubs" represent these societies in the Federated Women's Institutes. This recommendation was adopted.

The clubs have no official organ,

but all notices and reports of club work are published in the Journal of Agriculture and Horticulture, published monthly by the Department of Agriculture of Quebec.

ONTARIO

BY GEO. A. PUTNAM, B.S.A., SUPERINTENDENT

IN Ontario there are over 900 branch institutes with a membership of approximately 30,000. The province is divided into three divisions, eastern, central, and western Ontario. Eastern Ontario contains three, central Ontario eleven, and western Ontario three subdivisions.

From each sub-division a representative is appointed to act on the provincial board of directors, and these directors from among themselves elect officers on the executive. The institutes are entirely independent of the department, so far as their local meetings are concerned. The provincial organization is also quite independent of the department, but is utilized in an advisory capacity. The superintendent of institutes assists in suggesting lines of work to them from time to time, and placing before them reports of what the institutes are doing in various sections of the province as well as other sections of the Dominion. We furnish lecturers for single meetings and also provide instructors for short courses as outlined in circular No. 18.

The membership fee of 25 cents per member is wholly used for local purposes. The government grant is \$3 to each branch having a membership of fifteen and holding at least six meetings a year and furnishing the reports asked for by the department, including a list of members, financial statement and brief reports of meetings. A grant of \$10 is also given to the district organization with an addition of \$3 on account of each branch in the district.

Annual conventions are held at Ottawa, London, and Toronto, plans for the same being made in co-operation with the representative of the provincial committee with additional members of the committee chosen at the time of the convention. Each branch and each district organization is entitled to one additional delegate and the branches in the district bear expenses of said delegate.

The principle and designation of the standing committees and the system of holding and financing their meetings is provided for in the constitution of the provincial organization and the following committees are named at the meeting held early in the year: health, education and better schools; immigration and soldiers' settlement; publicity, and possibly one or two additional committees.

The delegates to the conventions from each sub-division name a representative from said sub-division, these representatives form the board of directors for the provincial federation, and the provincial federation names its representatives to the dominion federation.

The "Canadian Home Journal" is the official organ for the Ontario women's institutes and gladly accepts practically all the news of general interest which is furnished. There are certain announcements of special interest to members of the Ontario institutes only and for this we pay not more than \$17.50 per month; although as a matter of fact the amount of such material at the regular rates would amount to considerably more than this.

MANITOBA

BY MISS GERTRUDE DUTTON, ACTING SUPERVISOR

THE year 1919 has been rather difficult for all organizations, owing to the reaction from the war, the influenza epidemic, and the strike in Winnipeg. However, the women's institutes have made progress and are planning for a very prosperous year. There are now one hundred and twenty-seven societies in Manitoba, with a membership of about two thousand six hundred.

The societies consist of groups of women who wish to meet together for the inspiration to be gained from social contact, and for an exchange of information relating to the welfare of the home, the community, and the nation.

The agricultural extension service stands ready to assist these societies in any way possible. Where practicable, an organizer is sent from the Department to help launch the new society. A woman in the community planning to organize writes to the Department for rules, regulations, and application forms. After receiving these, she arranges for a place of meeting, advertises it as widely as possible, by telephone, by notices in public places, by advertisements in the local paper, and by any other means which suggests itself. When the women assemble, the one who sent out the notices calls the meeting to order and the formation of a society is proceeded with.

Usually, the constitution and by-laws suggested by the extension service are adopted, although each society is free to prepare a new constitution and by-laws, or to adopt such parts of the one suggested as may best suit local conditions.

Any woman in the community, over sixteen years of age, who has paid the membership fee of at least 25 cents, is eligible to become an active member.

The officers are a president, secretary, treasurer, auditor, and one

vice-president for each committee. The number of committees depends upon circumstances. These will probably include, besides the executive committee, one on programs, Red Cross, social service, foods, boys' and girls' clubs, membership, rest room, library, or any other which may seem desirable. These officers with enough additional members to total twelve, will form a board of directors.

The societies are strictly non-partisan and non-sectarian.

The government pays a grant of fifty cents each, for the first ten members, and twenty-five cents each for every additional member. The funds may not be expended for any object not connected with the provisions of the society.

The agricultural extension service sends to the societies suggested programs for the meetings, on request. These are on two lines, one on matters of interest to the individual homes, the other related to community or national development. Literature, helpful in preparing papers on these topics, is also sent when requested.

During the war, in many towns, all Red Cross work was handled by the institutes. As there is no longer any necessity for this, attention is being turned to some line of community work.

The boys' and girls' clubs are considered one of the most important features of community activity. The women's institutes have a big opportunity for helping along this line.

A great need, in small towns, is for some place where the women from the country may go to rest, leave their extra clothing, so often necessary for long cold drives, care for their children, and wait till it is time to start home. Until the women's institutes opened rest rooms, there was no place except the stores, where the women felt very much in the way. Now they may go to a warm,

comfortable room, in which they are part owners, have a cup of tea, and read a recent magazine, without the uncomfortable feeling of being unwelcome.

Libraries have been a long-felt want in the small towns. Several societies have started modest ones, buying a few books at a time, and keeping them in the home of a willing member, the local bank, the post office, or in the rest room. A few societies have taken advantage of the McGill travelling libraries.

At the beginning of this new year the extension service has arranged to provide a limited number of travelling libraries to the societies desiring them. These consist of about fifty books packed in a neat strong box, suitable for the dual purpose of a shipping box and book case. These are loaned for a period of four months, for the nominal sum of \$2.00 to cover carrying charges.

Several societies devote considerable attention to community improvement, such as beautifying the cemetery, endeavouring to keep vacant lots from being such eyesores as they sometimes are, and other work similar to this.

On the extension staff are millinery, dressmaking, cookery, and canning demonstrators, who give short courses to the societies who care to have them. Lectures on household art, illustrated with lantern slides, are also given.

The chief effort of the women in any community is the furthering of anything which will contribute to the well-being of the children. Much

attention is given to methods of better housekeeping and home-making.

The institutes are co-operating with the schools. A sympathetic attitude towards the teachers and their problems is being cultivated. Sewing and cooking lessons are given to the girls by housekeepers who are experts in their own particular lines. The health of the children is demanding much attention.

During the past summer a number of district conventions were held, which proved to be of considerable inspiration to the societies represented at them. They were very successful in spite of the severe handicap of the strike, which prevented adequate advertising. The telephone service was much upset, mails were extremely uncertain, papers were not published, and there was a serious shortage of gasoline for use in automobiles. Two sessions were held, one in the afternoon and one in the evening. Each began with a few minutes of community singing. In the afternoon talks were given on women's work. The evening sessions were attended by large gatherings of both men and women. Addresses of universal interest were given.

An effort is being made to bring the new Canadian women and older girls into a fuller share in Canadian citizenship, by getting the women to join the institutes, and take some part in the programme, even if it is only to illustrate how fabrics were made in their native country.

SASKATCHEWAN

BY MISS ABBIE DELURY, DIRECTOR

THERE are now operating in Saskatchewan 180 home-makers' clubs with a total membership of 5,000. These clubs are so scattered and some so isolated that district organization has not yet been considered practicable.

The director, who is known as the director of women's work, is left entirely in charge of the management of the clubs. The nature and character of the work, however, must be consistent with the constitution. Matters of policy, etc., are under the

control of the university authorities who in all cases consult with the director.

The membership fee is provided for in the constitution as "not less than 25 cents." The clubs are helped by the Dominion grant under *The Agricultural Instruction Act*. Last year the apportionment was \$5,500; this increases from year to year with the increasing needs.

The provincial convention is annually held at the University of Saskatchewan. Delegates are appointed by the several clubs and one official delegate from each has single fare paid by the Provincial Department of Agriculture. Frequently the club finances a delegate who is known as a club delegate. The programme is arranged by the director and the convention is directed by a committee of club members appointed by the convention. There are no standing committees. Subjects under consideration are gathered from the provinces through correspondence with the director. Questions are then brought before the general convention, consideration of them is left in the hands of the committee. Resolutions are then discussed and acted upon by the con-

vention. Representatives to the Federation of Women's Institutes are left to the choice of this annual gathering. We have no official organ. At times we have had some space in the women's page of the paper but it has never proved satisfactory.

It may be thought that we lack machinery in our system but as it actually works out it proves most satisfactory to every one. Most of our members are kept busy with community activities and problems and cannot attend to much "outside work." Under this system women work independently without rules and regulations from outside sources and are thus developing the work in a natural and truly educational way.

We are linked up with the Provincial Council of Women and thus with most of the other women's organizations in the province. In this way we get interchange of ideas and active co-operation in public movements. Our members are represented on the standing committees of the provincial council. Our strong point is co-operation with all organizations in the province that are working for public welfare. This co-operation makes for both thoroughness and economy.

BRITISH COLUMBIA

MRS. V. S. MACLACHLAN, SECRETARY

THERE are at present four districts in which the institutes operate, Vancouver Island with 17, Lower Mainland with 18, Kootenay and Boundary with 16, Okanagan and North Thompson with 17, making a total number of 68 institutes in British Columbia with a membership of over 3,000.

The membership fee is decided upon by the members of the different branches who may fix it at \$1 or at 50 cents. The government grant is given per capita. If the fee is \$1 the department gives a per capita grant of \$1 up to a membership of fifty, and where the membership fee is

50 cents the department gives a per capita of 50 cents up to a membership of one hundred. The funds of the institute are under the control of the directors and none shall be used in any manner not strictly pertaining to the objects of the institute. The per capita government grant as provided by *The Agricultural Associations Act* is paid on the membership as returned by the secretary on the 30th of June of the current year.

The superintendent of institutes conducts the correspondence with, and relating to, the institutes and supervises their work in accordance with the several acts, rules and regula-

tions pertaining thereto; prepares circular letters; receives and publishes reports; supplies forms and books to local secretaries, and prepares and issues from time to time suggestions to officers and directors of the institute.

There have been no provincial conventions in British Columbia as yet. District conferences have been held only in each district and the government pays the expenses of one delegate from each institute. The branches pay the expenses of as many

others as the members see fit to send. The system of appointing representatives to the women's institute federation has not yet been determined, but if a provincial convention is decided upon the representatives will probably be elected at that time.

The women's institutes of British Columbia have four pages of *The Agricultural Journal* devoted to their work. This is their only official organ at the present time.

NOVA SCOTIA

AGRICULTURAL ACTIVITIES

BY J. G. ARCHIBALD, B.S.A., AGRICULTURAL COLLEGE, TRURO

THE annual conclave of Nova Scotian farmers, held at Kentville from January 27th to 29th, was one of the liveliest sessions since the beginning of the war. Attention was for the most part centred on the problem of securing adequate facilities for the marketing of beef, mutton and pork. It was strongly urged that if a public abattoir, stock yards, and cold storage plant could be established at Halifax, such equipment would stabilize prices and encourage the production of all these classes of livestock.

Mr. H. S. Arkell, Live Stock Commissioner, was present, and while thoroughly concurring with all that was said, stated that the volume of trade was not yet large enough to justify the existence of an abattoir. He recommended that in order to give the farmers an opportunity to market their stock on a competitive basis, it would be well if the transportation companies would arrange to provide rapid transit facilities to Montreal. Such a procedure would develop the trade and pave the way for a local stock yard. At the close of the discussion the delegates were unanimous in favor of a strong effort

being put forth to at least provide cold storage facilities at the ocean terminals in Halifax. This would in part facilitate transcontinental trade and also help to solve the local cold storage problem.

CREAMERY OUTPUT IN NOVA SCOTIA.

Some idea of the development of the dairy industry in Nova Scotia can be obtained from the following figures:

1918—Total output from 22 creameries—1,762,364 lbs. of butter, valued at \$872,328.27.

1919—Total output from 22 creameries—2,093,804 lbs. of butter, valued at \$1,172,410.90:

Perhaps the most phenomenal development of all has been at the Scotsburn Creamery, Scotsburn, Pictou Co. In 1909, this creamery had 81 patrons and paid on an average 24 cents for butter fat. The amount of butter manufactured was 34,325 lbs., valued at \$6,801.18. In 1919, there were 700 patrons, the average price paid for butter fat was 63 cents, the amount of butter manufactured was 446,171 lbs., valued at \$243,275.18.

ALUMNI ASSOCIATION.

On January 21st, the N.S. Agricultural College Alumni Association held its annual business meeting at the college, followed by an Alumni supper at night. Owing to severe snowstorms which had prevailed for several days and blocked traffic all over the province, the attendance was small, but the score or so of Alumni who were present enjoyed their little re-union very much. Representatives were present from the graduating classes of '07, '08, '09, '10, '12, '13, '14, '15, '16 and '19. Officers elected for the ensuing year are as follows:

Hon. President—Prof. H. W. Smith Truro.

President—H. S. Cunningham, B. S.A., Truro.

1st Vice-Pres.—R. W. Donaldson, B.S.A., Port Williams, N.S.

2nd Vice-Pres., —Otto Schafheitlin, B.S.A., Canning, N.S.

General Secretary—J.G. Archibald, B.S.A., Truro.

On the following day a memorial tablet of solid bronze, dedicated to the memory of former students of the agricultural college who were killed or died while on active service, was unveiled before a crowded auditorium in the main building at the college. The ceremony was simple, brief, and impressive. The speakers for the occasion were Dr. M. Cumming, principal of the college, and Hon. E. H. Armstrong, Commissioner of Works and Mines, for the province. Hon. Mr. Armstrong unveiled the tablet. Both paid glowing tribute to those who had fallen and pointed out the duty and responsibility of those who remain. The tablet has twenty-two names inscribed on it and was purchased with funds raised for the purpose by the alumni association from among its members.

QUEBEC

AGRICULTURAL JOURNALISM AT STE. ANNE DE LA POCATIÈRE

BY REV. NOEL PELLETIER, DIRECTOR

THE first issue of the new magazine being published by the students of the agricultural school at Ste. Anne de la Pocatière appeared on December 8, 1919. This magazine, which is quite modest in appearance, is being published by the students themselves with two objects in view. First, it stimulates the interest of the students in each other and develops a spirit of co-operation which is beneficial. Secondly, it will serve as a medium through which the agricultural students will be able to express their views on agricultural topics, and current affairs of interest to their

circle of readers. This is a decided advantage to those who wish to make an advance in agricultural journalism. From a financial viewpoint the students cannot afford to publish anything that is not worth while and it is their ambition to issue each month numbers which will do credit to the school.

"*La Bonne Terre*" will fill a very necessary place in the lives of the students at the agricultural school and will be gladly received by their friends. It is hoped that it may grow from its present size until it becomes a publication which will carry weight in the province.

POULTRY KEEPING IN 1919

BY BRO. M. LIGUORI, CHIEF POULTRY HUSBANDMAN, QUEBEC

IN the province of Quebec as in other provinces, poultry keeping which, for some years previous, had been on the increase, came to a standstill during the war, for the same causes as elsewhere:—scarcity of help, exorbitant prices of grain, and the necessity to increase the field crop production and live stock breeding in order to prevent threatening starvation.

To these causes, general throughout the country, must be added, as regards Quebec, the sugar-making industry, conflicting as it does with the most important and the most valuable time of the year as regards poultry work; the incubation period and the first stages of chick raising. Habits are firmly implanted in our rural population, and when the bright rays of the April sun bring the birds back to the outskirts of the bush, our people—the farm people—cannot resist the temptation of spending three or four weeks in the old maple bush, under the warm spring sun, in front of the bright fire of the rustic arch, to make a crystalline and odoriferous syrup, that now sells for almost its weight in gold, and the making of which, for the habitant of old Quebec, is a sport and prolonged picnic. For the farmer of Lower Canada who has been making maple sugar, for over three centuries, this industry is national to a greater degree than for any other of his colleagues of other provinces, where the maple tree grows spontaneously. It has become a regular habit, through three centuries of practice—a practice often difficult, but always attractive. So poultry breeding suffers somewhat from the maple sugar industry.

Notwithstanding these factors, or perhaps on account of these factors, poultry breeding has increased during the war in the cities and their suburbs, towns and villages, but to a very much less extent on the farm. There has even been a step backward on the farm, except as regards the quality of the products which has

continued to improve, as shown by the repeated statements of large firms dealing in poultry products.

But eggs at one dollar a dozen and good fowl at half a dollar a pound will encourage the farmer to give more attention to his flock and bring it up-to-date. This is clearly evidenced by the many requests for information that have been received for several months by the Poultry Branch, and by the incessant and numerous applications for breeding stock of good strains, for the next breeding season.

DISTRICT POULTRY STATIONS.

In view of these facts the Department of Agriculture has made strenuous efforts to develop and improve poultry conditions in the province of Quebec so as to reach, in 1921, the proposed objective of an average of one hundred hens per farm.

Through the Poultry Division, the Department has operated, during a period of twelve months, eighteen district poultry stations and established five larger stations, where custom hatching is practised.

These stations are provided with large incubators, Buckeye, Candee, and Quebec, and have now a capacity of 30,000 eggs for incubation or about 100,000 eggs for the season.

Between January and October 1919, one of these stations, that of Princeville, has sold in co-operation, for the farmers of the district, 13,068 dozens of eggs bringing \$6,166.56. The year previous the same co-operative association had handled 10,356 dozens of eggs, making a sum of \$4,453 58.

OTHER POULTRY DIVISION ENTERPRISES.

Seventy-two poultry houses to be used as models in various localities were built by the Poultry Division, with the help of expert workmen. About 5,000 eggs were distributed to the young women's clubs and 25,000 eggs to the pupils of the

schools, where school fairs are held. Most of these eggs are from American breeds and all are from hardy strains. These school fairs are both horticultural and avicultural.

On the 1st of November last, laying contests were opened in four districts. Competitors must present a monthly report of their receipts and expenditure, and are rewarded for their work by prizes in form of eggs or selected breeding stock, given by the Department.

Six instructors and lecturers spend the whole year in supervising and teaching at the stations, exhibitions and at short courses.

During the year the Department has assisted in the organization of a Provincial Poultry Association, which becomes the head association for the 12 or 15 district associations already in existence; twelve of these associations intend to hold a poultry fair this winter.

PRIZES AT POULTRY FAIRS.

A new and double list of prizes has been granted by the Minister of Agriculture to successful competitors at poultry fairs. Under this list a sum of \$500, in the shape of prizes only, is offered to any local association. It has also been decided to supply coops, free of charge, and to pay for the transportation of same. Under this new and generous scale of prizes, both classes of exhibitors the general farmer and the specialized breeder, receive the privileges which both claim.

ORGANIZING HUGE EXHIBITION

The Department will spend over \$5,000. during the year to thoroughly organize the provincial poultry association and its branches. This expenditure will be considerably increased in 1921 when the newly organized association will hold a large poultry exhibition, that will compare favourably with any other fair of the kind in the Dominion.

IMPORTATION OF BREEDING HORSES

BY OSCAR LESSARD, SECRETARY, COUNCIL OF AGRICULTURE

IN JANUARY, 1919, the Quebec Department of Agriculture practically took over the management of the importation of breeding horses from the United States. Since then forty-eight pure-bred registered horses have been imported as follows: Percherons; 13 stallions, 27 mares; Belgians; 6 stallions, 2 mares. Several of these animals had already won a number of prizes the Chicago International Fair, as well as at various state fairs.

All these animals were selected with particular care by competent persons, sent especially for the purpose by the Department of Agriculture, and this breeding stock is very popular here. Such importations are likely to greatly improve the quality of the horse population of our province, as well as the conditions of breeding, and are heartily approved by all.

Most of these horses are purchased by the agricultural associations at very advantageous terms, as regards price and conditions of payment. The associations place these horses at the disposal of their members, and as the service fees are comparatively low, the farmers belonging to these associations naturally take a great interest in the matter.

The steps taken by the Quebec Department of Agriculture to improve present breeding conditions are looked upon favourably by all and are heartily appreciated by the agricultural associations and breeding syndicates. It is to be hoped that the farmers will do their share by providing for the good maintenance of such breeding stock, and by working towards a constant improvement of the horses of the district.

ONTARIO

SYSTEMATIC EXPERIMENTS

BY PROFESSOR C. A. ZAVITZ, D.A.SC., SECRETARY EXPERIMENTAL UNION

THE Agricultural College and the Experimental Union conduct experimental work with those classes of crops which are now used on fully 90 per cent of the cultivated land of the province. The following gives the summary results, in tabulated form, of the different varieties of grain crops tested throughout Ontario in 1919:

Experiments.	Varieties.	Comparative Value.	Yield per acre.		
			Straw.	Grain.	Grain.
			tons.	bush.	lb.
Oats.....	O. A. C. No. 72.....	100	1.19	41.46	1,410
	O. A. C. No. 3.....	71	1.05	38.92	1,323
Six-rowed Barley and Emmer.	O. A. C. No. 21.....	100	0.42	23.33	1,120
	Common Emmer.....	88	0.59	22.30	1,070
Hulless Barley.....	Guy Mayle.....	100	1.21	28.55	1,713
	Black Hulless.....	100	1.38	26.52	1,591
Winter Emmer and Winter Barley.	Winter Emmer.....	100	0.51	21.50	1,720
	Winter Barley.....	92	0.38	19.75	1,580
Spring Wheat.....	Wild Goose.....	80	1.19	19.75	1,185
	Marquis.....	100	1.21	18.96	1,138
Winter Wheat.....	O. A. C. No. 104.....	100	1.83	28.93	1,736
	Improved Imperial Amber.....	86	1.81	28.18	1,691
	Improved Dawson's Golden Chaff.....	90	1.98	26.97	1,618
	Kharkov.....	43	2.15	23.54	1,412
	Yaroslaw.....	48	2.05	23.39	1,403
Spring Rye.....	O. A. C. No. 61.....	100	0.87	27.50	1,540
	Common.....	67	0.73	23.40	1,310
Winter Rye and Winter Wheat.	Petkus Rye.....	100	1.35	21.14	1,184
	Improved Imperial Amber.....	93	1.16	19.40	1,164
Buckwheat.....	Rye.....	100	0.60	30.28	1,454
	Silver Hull.....	100	0.92	20.55	986
Field Peas.....	New Canadian Beauty.....	100	1.21	22.73	1,364
	Potter.....	93	1.22	22.20	1,332
	Early Britain.....	83	0.94	21.21	1,273
Field Beans.....	Pearce's Improved Tree.....	100	1.17	25.00	1,500
	American Wonder.....	62	0.77	15.00	900
	Elliott Pea.....	43	0.94	14.43	866
Soy or Soja Beans....	Habara.....	100	0.88	17.77	1,066
	Brown.....	88	0.73	12.89	774
	O. A. C. No. 81.....	75	0.63	12.23	734

EXPLANATION OF TABLE.

In column number three of the tabulated results of the grain crops here given, attention is called to the

fact that the comparative value was made up from the answers received from the farmers who conducted the experiments after they had taken

everything into consideration. In the fourth column, yield of straw per acre represents the total crop less the amount of grain and, therefore, includes the chaff with the straw. The yield of grain is given in pounds as well as in bushels per acre in order to make the results clearly understood, and that certain comparisons may be made between the different classes of crops as well as between the varieties in each class in a season such as we had in 1919.

Definite determinations can be made between the varieties of each class of farm crops as they were grown on the same farm and under similar conditions. Caution, however, should be exercised in comparing one class of farm crops with another as it should be understood that these have been grown on different farms. Owing to the great variation in the weight per measured bushel of different classes of crops it is easier to compare the weight in pounds than in bushels of grain per acre. In working out

the number of bushels per acre, the standard weights per measured bushel have been used for each class of crop.

POTATO INVESTIGATIONS

For the co-operative experiments, it was decided to distribute only two varieties of potatoes in the spring of 1918, viz., Irish Cobbler and Green Mountain, the former being an early and the latter a late variety. These two varieties are extensively grown and it is desirable that those sections of Ontario well suited for potato growing commercially confine themselves to one or two varieties. In 1919, 107 separate tests were successfully conducted throughout Ontario with the Irish Cobbler and the Green Mountain varieties of potatoes. In order to make the experiment as reliable as possible the seed of each of these varieties was obtained from southern Ontario and from northern Ontario. The following gives the average results of the 107 co-operative tests made in the past year:

Varieties.	Percentage of Disease.				Results of Co-operative Tests.								
	Leaf Roll.		Mosaic.		Rotten Potatoes.			Small Potatoes.			Average yield of total crop per acre (tons).		
	1918	1919	1918	1919	1918	1919	Ave.	1918	1919	Ave.	1918	1919	Ave.
Irish Cobbler.....	5.7	1.4	3.0	0.0	0.4	0.2	0.3	16.7	14.0	15.4	134.3	111.1	122.7
Green Mountain....	14.2	0.9	33.6	0.0	0.5	1.5	1.0	16.3	9.5	12.9	129.5	132.5	131.0

The average results of the Irish Cobbler and also of the Green Mountain varieties obtained from two different sources in each of the past two years show that in 1918 the Irish Cobbler surpassed the Green Mountain by 5.2 and in 1919 the Green Mountain surpassed the Irish Cobbler by 21.4 bushels per acre. The difference in the results may be accounted for by the strains of the potatoes used, by the seasonal conditions or by the amount of Leaf Roll and Mosaic in the Green Mountain in 1918. The average results for the two years show that the Green

Mountain has given 8.3 bushels per acre per annum more than the Irish Cobbler.

In securing potatoes from two sources, care was taken to obtain seed as free from disease as possible. We are very pleased to state that the seed obtained in 1919 was entirely free from Mosaic and had a very small percentage of Leaf Roll. We are grateful for the potato inspection work carried out in the fields in each of the past two years through the co-operation of the federal and the provincial Departments of Agriculture.

SOUTHERN AND NORTHERN GROWN
SEED POTATOES

An experiment has been conducted at the College for several years in succession by testing potatoes obtained from different sources. The main sources of seed have been southern Ontario, northern Ontario and New Brunswick. Seed potatoes obtained from one hundred and forty miles north of Guelph in the Muskoka District near the Muskoka Lakes have given higher yields per acre than those obtained from southern

Ontario or from New Brunswick. More recently, potatoes have been obtained from Algoma, Thunder Bay and Rainy River districts and these have given good results for seed purposes.

In 1919 two varieties of potatoes were obtained from southern Ontario and also from northern Ontario and these were carefully tested in a co-operative way throughout the province. The average results of sixty-six reports of carefully conducted experiments received from over the province are as follows:

Districts.	Average Percentage of Disease.				Average Yield of Potatoes per Acre.		
	Leaf Roll.		Mosaic.				
	1918	1919	1918	1919	1918	1919	Ave.
Northern Ontario.....	0.0	0.9	2.2	0.0	bush. 142.8	bush. 134.6	bush. 138.7
Southern Ontario.....	24.9	1.4	5.1	0.0	123.9	128.5	126.2

It will be observed that the potatoes used in 1919 were particularly free from disease. It will also be seen that the northern grown seed

gave an average yield per acre over southern grown seed of 18.9 bushels per acre in 1918 and of 6.1 bushels per acre in 1919.

INTERCOUNTY LIVE STOCK JUDGING COMPETITION
AT OTTAWA WINTER FAIR

THE regular intercounty live stock judging competition was conducted at the Ottawa Winter Fair on January 15th and 16th, by R. S. Duncan, supervisor of agricultural representatives for Ontario. Classes judged were dairy cattle, beef cattle, heavy horses, swine and sheep. Supervising judges for these various classes were selected

from among the live stock men of the federal and provincial departments of agriculture. Eleven teams competed and the final placings were as follows:—1, Carleton; 2, Leeds; 3, Grenville; 4, Lanark; 5, Dundas; 6, Glengarry; 7, Lennox & Addington. The members of the winning team were E. Croskery, L. Armstrong, and E. Armstrong, all from Kinburn, Ont.

MANITOBA

DEMONSTRATION FRUIT FARM

BY H. E. WALKER, SUPERINTENDENT

AGRICULTURAL work is at present being carried out mainly along a single line at the Provincial Demonstration Farm at Killarney, Manitoba. This farm is but newly organized and as yet has not reached the stage where numerous activities can be engaged in but it is quite likely that in the near future agriculture in all its branches will thrive on this Farm in Manitoba. Funds from *The Agricultural Instruction Act* grant are being used for the purpose of developing agriculture on this Demonstration Farm and carrying on the experiments that are now under way.

HORTICULTURAL ENDEAVOURS.

The principal phase of the work carried out at the Demonstration Farm is horticulture.

Definite attention was turned to this work in the year 1918. The aim is to test out the possibilities of varieties and to demonstrate the practicability of growing such as stand the test under average farm conditions on the open prairie. An endeavour is also being made to show that no home need be without some beautification, that is as to flowers, shrubs, trees, and lawn.

SHELTER.

On the majority of prairie farms protection was our first requirement. We were extremely fortunate in having some shelter to the north and the west, but particularly, wind-breaks had to be established to the south, to protect from the driving winds—the sand drivers—from this direction. Our first attempt, 1918, to start a belt of trees was a failure due to the drifting sand cutting each succeeding shoot clean to the ground. During the spring of 1919 young trees and cuttings which were planted made

good growth and will no doubt become firmly established this coming year. As we desire quick results the trees used consist of Russian Poplars, Cottonwoods, Laurel and Golden Willows, and Manitoba Maple or Box Elder. The latter tree is however looked upon with some disfavour due to the fact that insect pests apparently prefer the same to many other trees.

For immediate and temporary protection extensive use is made of the Giant Russian Sunflower, which grows with us to a height of ten to fourteen feet or more. For such a purpose the sunflower is excellent.

SMALL FRUITS.

Many varieties of small fruits grow wild throughout Manitoba, but the majority of the farmers pay no attention to the cultivation of these fruits. Practically without exception the hardier varieties of currants, raspberries and some gooseberries, do well.

Some of our most interesting work is being done with strawberries, and while fair success is attained with the June bearing varieties yet our tests to date would point to the Everbearing strawberry as the kind for the average farmer. Strawberries, of the *Americus* and *Progressive* varieties, planted last June bore ripe fruit as late as October ninth, besides being still in blossom.

TREE FRUITS.

As to the Standard apples and crabs little can be reported as the same were planted 1918. Some are making satisfactory growth but others are freezing back somewhat severely. We have no standard apple that can be planted out indiscriminately. Crabs, as *Transcendent* and *Hyslop*, are hardier, and some trees are doing well

in the district. A start has also been made with plums and cherries, so far not very satisfactorily.

It is to the growth and development of seedlings that the prairies have to look for tree fruits.

TREES AND SHRUBS.

As many trees, flowering shrubs, etc., are needed in our work, a nursery is gradually being established as protection and other facilities materialize. Many kinds of hardy shrubs have been planted and considerable use will be made of native

stock. Seed is gathered from wild plants and will be sown in nursery rows and development noted.

ORNAMENTAL PLANTING.

The grounds are gradually assuming definite shape and many varieties of flowering shrubs and hardy herbaceous perennials are growing and giving excellent results. Of the perennials calling for special mention are the following: Bleeding Heart, Achillea (The Pearl), Columbine, Larkspur, Poppies, Gaillardia, Hesperis, Milfoil (pink), and Iris.

ELECTRICAL TREATMENT OF SEED

BY S. C. LEE, M.A., PROFESSOR OF DEPARTMENT OF PHYSICS AND MATHEMATICS, MANITOBA AGRICULTURAL COLLEGE.

IN the February, 1919, number of *The Agricultural Gazette*, a short outline was given of investigations being conducted by the Physics Department of Manitoba Agricultural College, on the electrical treatment of seed. From some one hundred and fifty tests involving modifications of voltage, amperage, temperature, direct and alternating currents, different chemicals, different strength of solutions, etc., the special treatment indicating the most hopeful results obtained up till April, 1919, was singled out, and an endeavour made to confirm the laboratory results by field tests.

Through the courtesy and co-operation of the Field Husbandry Department of the College two plots were seeded side by side with Marquis wheat, both plots having received the same pre-cultivation. During the early period of growth no difference was apparent from casual observations of the two plots, but toward the maturing stage the electric treated plot showed a slightly ranker growth of straw, and ripened more slowly. Both plots suffered somewhat from rust.

Cutting and threshing of the crop from the two plots was carried out under the same conditions, and the chief results obtained are shown below:

—	Date of Seeding	Date of Ripening	Date of Cutting	Date of Threshing	Yield of Grain Bush per Acre	Yield Straw Lbs. per Acre
Electric treated.....	May 12	July 31 to Aug 6	Aug. 8	Aug. 20	18	4,800
No treatment.....	May 12	July 30 to Aug. 6	Aug. 8	Aug. 20	14½	4,266

Although no definite conclusions can be drawn from so limited a field test in which experimental error

might play considerable part, still the fact that the results were in accordance with the laboratory tests

gives sufficient encouragement to justify further research along this line. It is hoped that by April, 1920, arrangements may be completed to try out in triplicate a number of field tests of seed treated similarly to

that of last season, and also some others which give promise of good results with entirely different treatment arrived at from more recent laboratory experiments.

SASKATCHEWAN

THE FUTURE OF THE HORSE INDUSTRY

BY J. G. ROBERTSON, LIVE STOCK COMMISSIONER

FIGURES from the Dominion Bureau of Statistics show that Saskatchewan leads the Dominion in the number of horses owned in the province, now being 1,078,452, an increase of 88,443 over 1918.

Out of this million horses possessed within the province, perhaps a quarter of a million are very valuable heavy draft animals; a half million are of very considerable value, being light draft and agricultural; another hundred and fifty thousand are useful horses with some market value; but there are probably one hundred thousand horses in this province (some of them weighing from 700 to 1,100 pounds, partly broken) that are of practically no value whatever. The fact, therefore, is clear that over nine hundred and fifty thousand valuable horses, are in the province, and one hundred thousand that are worse than useless.

HIGHER STANDARDS PROPOSED

With these facts in mind, it is self-evident that further improvement of the horses of the province must be accomplished, and the best way is by the careful selection of good sires. Very valuable work has already been done in this direction by the Saskatchewan Stallion Board.

The Horse Breeders' Act, 1918, requires every stallion in the province to be inspected and put in a certain category, depending upon conformation, soundness, and, if a heavy draft horse, his size and weight,

considering condition. After examination, a pure-bred animal may receive any one of four permanent certificates—A, BB, B, and C. In addition, it is proposed to make a very special first-class, called "AA." No horse will be allowed in this class that is not very high-class in every respect, and in addition, must have shown by his breeding record and by his progeny that he is a very superior sire. Pure-bred stallions that are not placed in any of these categories will be either given a "G" certificate or at once rejected. The "G" certificate means that this horse will be allowed to travel for one year and at the end of that year automatically rejected. This is done to prevent undue hardship and to give the owner an opportunity to make such disposition of this horse during that period as he can. A horse put into "G" category will not be re-examined at the end of the year.

STALLIONS REJECTED

"Of 1,598 stallions which were examined last year 154 were definitely rejected and refused a license, and 11 more were given a "G" certificate. The fact that 165 inspected stallions have been rejected and prevented from standing for service should mean much for the improvement of horses throughout the province. Possibly the Stallion Board have been too lenient in their examinations, and it might be advisable for the Horse Association to urge them

to raise their standards surely and gradually. The fact that stallions are graded should encourage farmers and mare owners to use class "A" horses in all cases where they are available.

SASKATCHEWAN LEADS STALLION ENROLMENT

According to a table in *The Agricultural Gazette* for December, 1919, showing the number of stallions enrolled in the various provinces with the exception of Quebec, Saskatchewan heads the list with 2,421 pure-breds, and 442 grades, a total of 2,863. This includes 1,316 Clydesdales, 817 Percheron, 171 Belgian, and 37 Shire.

"This table shows clearly that Saskatchewan has at last become the centre of the draft horse industry of Canada. It should give us considerable pride to know that this province possesses more Clydesdale stallions than any other province, and more Belgian stallions than any other province. While not a very important point, it is interesting to note that there were only 15,102 mules in Canada last year, and of these 14,522 owned in Saskatchewan.

WHAT THE HORSE MARKET DEMANDS

Owing to the destruction caused by the war, the supply of horses in the world has been very seriously depleted. A world shortage of 3,468,000 head of horses was reported last summer. The countries which were short were particularly those that had taken part actively in the war, such as France, Belgium, and Poland. Events have now proved that the army horse has not glutted the world's markets in any degree. On the other hand, the horsemen in

this country have not profited much from the shortage in Europe owing to the excessive transportation charges by land and sea; the fact that the European nations who were willing to purchase horses had no money and would only be able to purchase on credit; the disinclination of European countries to allow any horses excepting geldings to be brought within their boundaries, and the fact that Great Britain was not in the market for any class of horse except the very heavy draft, a type for which ready market can be found at home. In spite of these handicaps, a number of horses were shipped over to Europe from the United States and a smaller number from Canada.

HORSES TO REPLACE TRACTORS

As the situation stands at the present time, there is a ready market for the best type of heavy draft horses. Some of the big firms in Chicago have from actual investigation arrived at the conclusion that for short hauls the heavy draft horse is a cheaper power than motor trucks, and these firms are going back to horses for their truckage work. Many farmers of this province who have been beguiled into the purchase of huge tractors have now realized that they have made a serious error and in many cases have returned to the use of horses for farm power, and are using their big engines solely for threshing work.

The prospects, therefore, are exceedingly bright for the heavy draft horse, and the efforts of the Horse Breeders' Association should be directed to the encouragement of the breeding of this type of horse only, as the demand is likely to exceed the supply for many years to come.

DAIRY DEMONSTRATION CAR

BY P. E. REED, DAIRY COMMISSIONER

THE Dairy Branch of the Saskatchewan Department of Agriculture in co-operation with the College of Agriculture and the Canadian National Railways is now conducting a series of educational meetings along the Maryfield branch of the Canadian National Railway. The Canadian National have supplied a large first class coach which has been equipped as a lecture car wherein the meetings are held, and a tourist coach for the accomodation of the speakers. A Uni Electric lighting plant loaned by the Canadian Motors Ltd., is placed in the tourist coach and furnishes light for a stereopticon which is used to illustrate the work covered by the speakers and also for the operation of a moving picture machine.

Slides are shown illustrating the different breeds of dairy cattle and various phases of the work connected with dairy production and manufacture. Herd management, feeding for milk production, individual testing and the best methods of handling and marketing dairy products are among the subjects dealt with.

The speakers in charge of the meetings are H. J. Crowe, official

butter grader, of the Department of Agriculture, Prof. MacKay of the Dairy Department, College of Agriculture, Saskatoon, and C. E. Thomas, supervisor of cow testing for Saskatchewan.

Motion picture films are exhibited showing the importance of the dairy industry and the value of dairy products in the human diet and where time permits other educational films in connection with various phases of agricultural and live stock work.

Reports received at the Dairy Branch of the opening meetings of the series held at Briercrest and Spring Valley respectively indicate that keen interest will be taken in the work along the lines of railway covered. Actual figures of attendance at these first two meetings show 57 and 89 persons respectively. At Avonlea the third point visited, separate meetings were held for the school children and the adults and the total attendance reached nearly two hundred.

The series of meetings as arranged covers the Maryfield branch from Briercrest to Maryfield, the Gravelbourg branch and the Radville Bengough branch. This series will run till March eleventh.

ROAD DRAG COMPETITION

THE first prize in the Road Drag Competition for 1919 was won by Rural Municipality 346, the second by R.M. 63, and the third by R.M. 222. There were sixty-seven entries, and altogether 228½ miles were dragged. Conditions last year were very unfavourable for road dragging, but

very good work was done, and there were many fine strips of road entered in this popular "Better Roads" competition. The province was divided into six districts for the road drag competition, each with five district prizes to compete for, as well as the three grand prizes.

THE HOG SITUATION

BY J. G. ROBERTSON

THE number of hogs produced in this province has decreased during the past year and the industry is now far from being in a thrifty condition. This is due chiefly to the fact that the prices of labour and grain have gone up at a greater rate than has the price of hogs. The figures issued by the Dominion Bureau of Statistics show a decrease of nearly a quarter of a million hogs in Canada, compared with 1918. The heaviest reduction of hogs occurred in the provinces of Alberta and Saskatchewan, Alberta reducing her hogs by 155,676, and Saskatchewan by 88,873. This reduction in Saskatchewan follows a reduction in the previous year of 52,000.

Statements issued by the Union Stock Yards, of Winnipeg, show that 268,628 hogs were received in their yards during the year 1919, compared with 362,675 during the year 1918. They also show that 124,807 hogs were received from Saskatchewan points in 1919, and 177,643 were received in 1918. These figures further show that although fewer hogs are being marketed each year, the production of hogs is falling off as well, so that the numbers that will go to the markets during the next two or three years are bound to be lower than even this year. Consequently, efforts should be made to increase and encourage the production of hogs rather than to discourage this production.

It is the man who sticks consistently and steadily to hog raising who will make the profits. There has frequently been what might be called a swing of the pendulum in the profits in hog raising, and the wise breeder was the man who was starting in to raise hogs when every one else was going out of them, for as soon as production is lessened the price is bound to go up, and the man who has sold out his hogs when the price was low now finds himself without any to sell when the price is high. Consequently, the breeder who raises a considerable number year in and year out will be in a position to profit by prices when the swing is in the opposite direction.

The Dominion Live Stock Commissioner, Mr. H. S. Arkell, on his return from Europe last summer, reported that the reputation of Canadian bacon, and Canadian Wiltshire sides in Britain at present was extremely high. He advises, therefore, that the Canadian swine breeders bend their efforts to the production of uniform and high-class bacon rather than endeavouring to compete with the Americans in the production of fatter pork. Canada, he further states, has an opportunity to develop an enormous export trade in the highest class of bacon, and partly because Holland and Denmark are not yet in a position to compete, due to the tremendous reduction of their live stock owing to the war.

Two and one-half millions of children were enrolled in the United States school garden army in 1919. It is estimated that these children produced food valued at \$48,000,000. With the coming of a new year the problems that confront us as educators are to increase this army, to make the garden work more permanent, and to increase its educational value. The motto of the garden army "Garden for every child—every child in a garden" can be realized only when gardening becomes a definite part of school work. John L. Randall, Director, U.S.S.G.A.

ALBERTA

SCHOOLS OF AGRICULTURE

BY HON. DUNCAN MARSHALL, MINISTER OF AGRICULTURE

AFTER six years operation of the schools of agriculture in the province of Alberta, we find that they have more than justified all the expectations that we had when they were established. The success of any educational institution must be largely measured, first by the desire of pupils to attend it and second, by the results achieved in instruction. The three schools established at Claresholm, Olds and Vermilion were opened in the fall of 1913, and in spite of the fact that they were the first institutions giving any training in agriculture in the province of Alberta, and that we had a number of students from this province attending agricultural colleges in other provinces, our attendance for the first term numbered 234.

The fall of 1914 found a great many boys enlisting. The number was increased in 1915, 1916 and 1917,

but in spite of this fact, our attendance for these three terms was in 1914-15, 286, in 1915-16, 337, in 1916-17, 326, in 1917-18, 327. In the fall of 1918 the "flu" epidemic made such tremendous headway in Alberta that all the schools were turned into emergency hospitals. This last fall of 1919, we find the farmers in over one-third of our province in very bad shape, because of drought, and consequently an exceedingly short crop. Had this not been the case, our school accommodation would have been entirely inadequate. Last October the principal of our Claresholm school had 92 letters on his desk from boys, regretting their inability to attend the school on account of a short crop, but expressed their determination to be in attendance in the fall of 1920 if they had a harvest at all; and in spite of these conditions the attendance this winter at the three schools numbers 280, which for a province with the population of Alberta, and a crop failure over one-third of the province, is reasonably good.

Our experience, however, has taught us that in order to get a maximum attendance, more schools should be built, as very few boys travel over 60 or 70 miles to attend one of the schools, consequently, last year we began the erection of three new schools at Raymond, Gleichen and Youngstown, respectively. These buildings are well under way, and will be open for students next autumn, and if the year is anything like a reasonably good one for the farmer, we should have anywhere from 700 to 900 students in agriculture in a province that perhaps has the third smallest population in the Dominion.

The schools are built to accommodate a maximum of about 150 students each, and our intention is not



THE HON. DUNCAN MARSHALL, MINISTER OF AGRICULTURE, ALBERTA.

to enlarge any of them but rather to increase the number of schools, as the thing vitally important to agricultural education is to get the place of instruction as near as possible to the homes of the boys and girls.

The sons and daughters of pioneer farmers appear to be able to travel only a certain distance in order to go to school. If the institution is farther away than 50 to 75 miles, it seems too remote. The young men and women do not see enough of it or learn enough about it to insist upon availing themselves of this educational opportunity, and their fathers and mothers have not sufficient knowledge of the school to realize the importance of sending them.

Our experience so far would lead us to believe that a great many farm boys and girls can be induced to attend these schools who would not attend an agricultural college. The difficulty with many of these young men and women, especially in a new country, is that their elementary education is very deficient, many of them not having completed the public school course. The result is they are very loath to attend a large and somewhat advanced institution where they will meet boys and girls very much their junior in years but very much further advanced in education. The humiliation of this circumstance has deterred many boys and girls from getting any more education after they had left the public school. A school of agriculture seems to fit in much better in cases such as these; it is a smaller institution. The boys and girls in attendance are largely the neighbours' sons and daughters. They are all more or less on a common footing. It is a less elaborate institution, the environment is distinctly a farm environment, and consequently these boys and girls, even though their education be very deficient, feel perfectly at home in an institution of this kind.

It is an appalling fact that the sons and daughters of farmers who for

one reason or another (and in our province the particular reasons are that their people have been very busy making a home on the prairie and seem to need their help) have had a very imperfect public school education, and that until the schools of agriculture were established, there seemed to be no opportunity for these boys and girls to get any further education. We now find that our schools of agriculture are capable of taking up these boys and girls and giving them a new start, not only in agricultural training for their occupation in life, but in general education, because we take special care to give careful instruction in English and mathematics and kindred subjects, in order that these students may go out from the schools not only trained in the science of farming but with a much improved general education. The result of this second start, so to speak, in their education, is bound to have a very great influence on the lives of these young men and women, and I have frequently expressed the opinion, that our schools of agriculture, in the kind of training they were giving, could do quite as much for the citizenship of the province as they could do for improved methods in farming. This new beginning in the education of these young men and women will not only cultivate a greater taste for reading but should greatly broaden the scope of their reading, in fact I am quite sure it gives them an entirely different outlook, not only upon their farm work and every day tasks, but upon the whole business of their lives and will have a vast and powerful influence in improving conditions of home life on the farm.

I am not depreciating for one moment the value and importance of agricultural colleges, but it is a question of reaching the farm boys and girls, and I believe the attendance at agricultural colleges in Canada could be very largely multiplied by the establishment of schools that would be the first means of inducing

boys and girls to become interested in scientific agriculture, who otherwise might never have, or take, the opportunity.

We have established a faculty of agriculture in our university, which confines its work entirely to taking students from the schools and training them for the degree of Bachelor of Science in agriculture, and when our six schools are in full operation, and I hope a number more will be added during the next few years, we will be sending forward from these schools a very large number of students to

the Faculty of Agriculture in the university, probably four or five times as large a number as we could possibly hope to have without the establishment of these schools. Personally I should like to see as many of our farmers' boys and girls as possible take the complete course at both the schools and the university, as agricultural operations in Canada in the future are going to require a degree of scientific knowledge, perhaps more than they have ever done before.

BRITISH COLUMBIA

THE INTERNATIONAL EGG LAYING CONTEST

IN the International Egg Laying Contest conducted by the British Columbia Department of Agriculture, 126 hens of the light weight breed laid, during the first three months of the test, which began on October 6th, 2,424 eggs. The pens of six each included 19 pens of White Leghorns and 2 pens of Anconas.

In the heavy weight varieties, 19 pens of six each laid, during the three-month period, 1,754 eggs. This class included four pens of Barred Rocks, 3 of Buff Orpingtons, 7 of White Wyandottes, 1 of Rose Comb Rhode Island Reds, 3 of Single Comb Rhode Island Reds, and 1 of Single Comb Rhode Island Whites.

At the head of all science and arts, at the head of all civilization and progress, stands, not militarism, the science that kills ; nor commerce, that accumulates wealth, but agriculture, the mother of all industry and the maintainer of life.—James A. Garfield.

PART III

Junior Agriculture

DEMONSTRATIONS, COMPETITIONS, AND CLASS-ROOM STUDIES IN RURAL
LIFE FOR BOYS AND GIRLS

ONTARIO

PRACTICAL AGRICULTURE TEACHING

BY NORMAN DAVIES, B.A., TEACHER SCIENCE AND AGRICULTURE, RENFREW COLLEGIATE INSTITUTE

DURING the last few years the teaching of agriculture as a subject in the schools of Ontario, has taken a decided step forward. The subject has been given a place on the curriculum, not a compulsory study, but optional so far

whose initiative and perseverance the success of the work almost entirely depends. In many schools today, where agriculture is being successfully taught, it would never have found a place except for the interest and untiring effort of some teacher.



A POULTRY HOUSE ON THE COLLEGIATE GROUNDS AT RENFREW

THE YARD IS COVERED TO KEEP OUT CATS WHEN SMALL CHICKS ARE PLACED IN THIS HOUSE IN THE SPRING.

as individual schools are concerned. This, in itself, would seem to cause a decrease in the number of schools taking the subject. However, liberal grants have been provided for school boards, and extra grants, over and above salary, to the teachers on

In some articles appearing in *The Gazette* within the last year the danger of making the teaching of agriculture too practical and mercenary has been pointed out. In the writer's opinion it is because agriculture as now taught tends to give

the pupil some idea of practical values, that it is having the great success which it duly merits.

EDUCATIVE AND PRACTICAL

From a purely pedagogic standpoint, the lessons and study are, of course, valuable as a training to the mind and an enlargement of the pupil's general ideas. But, the practical every day man sees too much of this in the other subjects on our curriculum and is always criticizing

On the other hand it must be clearly recognized that, because a boy or girl undertakes to raise chickens, or a pig or a garden and thereby make a few dollars, he is not by any means learning "farming". Our agriculture teaching is not intended to be a "vocational" training at this stage at all. Rather it is to broaden the mind and make the pupil better able from small experiments to decide as to his future course in life. The experiments are conducted in "Nature's own great lab-



A PORTION OF THE INDIVIDUAL GARDEN PLOTS IN THE RENFREW COLLEGIATE INSTITUTE GARDEN.
PHOTOGRAPH TAKEN IN AUGUST, 1919

that very feature in connection with our educational system. Why not teach a pupil by his own actual experiences if possible, that he can make a few dollars in various "home projects" followed out along "scientific" lines? Unless the methods advocated by an agriculture teacher will bring in returns, the practical man, whose boys and girls are being taught, is inclined to scoff at the whole thing.

oratory" and their success depends on the care and pains taken just as much as in an experiment conducted in the school laboratory.

RENFREW AGRICULTURAL ENROLMENT

In our work in the Renfrew Collegiate we aim to work along this line. At the present time, of 245 pupils enrolled, 145 are taking agri-

culture, of whom 55 are girls. We have four classes and carry on the work according to the syllabus, in both lower and middle school. Only about a third of those enrolled in agriculture come from farm homes and it seems to me that agriculture as now taught in Ontario is just as important in town and city schools as in the rural districts. If every town dweller had his own small garden and flock of poultry the cost of living would soon materially decrease.

TEACHING METHODS

The principal and Board of Education in Renfrew are strongly in sympathy with the work and give every assistance to its success. The teacher of agriculture must do things differently. He cannot confine himself to class room exercises alone. Outside practical work is necessary to give pupils an active interest and to let outsiders know what is going on. We of course follow the regular work prescribed for examination purposes but specialize on poultry work and gardening. Our equipment has been secured with the departmental grants of the last three years and is being added to each year. In the classroom the milk scales, the Babcock test, the lactometer test, sediment test, experiments to show causes of milk contamination, and simple analysis of milk are taken up. The parts of the cream separator are shown and the working of the separator demonstrated by a separator loaned for that purpose. In the fall "cold pack" canning of fruits and vegetables is done in class and the jars kept from year to year as a check on the methods used. Germination tests for seeds are also made and bulbs grown indoors. Other topics are covered in a similar practical way.

POULTRY ENTERPRISE

Last spring pupils brought in eggs for early hatching in the two school incubators. These chicks were kept in the school basement for about three weeks and then taken home. During the season 271 chicks were hatched, of which 200 lived to maturity. About 25 pupils were interested and 8 town boys and girls had never kept poultry before. Some had to build houses and are this winter getting fresh eggs and showing a profit. One boy whose 5 pullets are housed in the school poultry house, in December and January got 144 eggs and will show a large margin of profit by spring.

A new department in the work was the building of a poultry house, 10 x 12 feet, on one corner of the school garden. It is divided, and part used for a tool house, the rest for poultry. This winter we have 21 pullets in the house and the methods of feeding, lighting and ventilation are exactly those which are given in the class instruction. In December they averaged 60 per cent production and for January, a very cold month here, about 40 per cent. In a practical way we are proving that pullets will produce winter eggs and by spring every pupil will know it. About 10 pupils from farm homes have undertaken the keeping of egg records from their home flocks to find out in fact whether they are paying or not. Some time during the year, the bleeding and dry plucking method of killing and dressing fowl is demonstrated and also a method of drawing the fowl. Much of this work is outside the examination requirements but it makes for success in the work.

SCHOOL GARDEN

Our school garden consists of a half acre of ground formerly waste land on the school property. Last year it was ploughed and two thirds used for individual plots. Sixteen

pupils had plots about 30 x 20 feet and the aggregate value of produce was over \$60. The other third was planted in grain and corn plots and were used in the spring to show the various kinds of farm crops. Fruit trees have also been planted on the plot.

This coming spring we are undertaking a new departure in garden work. On more than one occasion this criticism has been levelled at school gardens. "We farmers and amateur gardeners cannot use the fertilizer and cultivation which you do—it won't pay! The government grant covers your expenses." There it seems lies a weakness. Experimental work is necessary but unless our gardens pay, and we can show that they pay, our influence to get

others to adopt our methods is very small. This year a part of our plot will be put into a marketable crop which will be sold to pay expenses. The regular grant will be devoted to experimental work on another section of ground.

REQUISITE FOR SUCCESS

To make the work successful requires untiring effort on the part of the teacher and the doing of many things not regularly expected of them. No doubt many others have found, as has the writer, that the reward of the effort brings a far greater satisfaction than any financial gain occasioned by the departmental grants.

GARDENING FOR CITY SCHOOLS

BY J. H. PUTMAN, INSPECTOR OF SCHOOLS, OTTAWA

WE have had four years' experience with school gardens.

In 1916 our first experiment was made with a small plot on the Glebe loaned by the trustees of St. Andrew's Church. This plot furnished us with individual gardens for 368 pupils, and with community plots sufficient to demonstrate the growing of the more important cereals.

ARGUMENTS FOR GARDENS

In 1917 the school board purchased from St. Andrew's Church an acre-plot to be used exclusively for garden purposes. My recommendation to make this purchase was not based upon a sudden impulse nor was it born of a war-time enthusiasm for gardening by city-folk. It was based on, (1) a conviction that many things which all city children ought to know can be taught only through an actual experience; (2) a belief in the same principle which has given

us manual training rooms and domestic science rooms for the education of children through their motor activities; (3) the same principle that moves us to provide laboratory practice for students in physics, chemistry or biology.

The school-garden is a big classroom for out-door instruction in plants and plant life. It has many of the possibilities in miniature of an experimental farm. It has to do with the composition and fertility of soils, with drainage, with seed germination, and with the insect enemies of plant life. It shows in a way that cannot be questioned the effects upon plants of too much or too little sunshine or moisture, of the bad effects of weeds, and the necessity of giving a plant plenty of room if we wish to secure a high state of development. These things would mean nothing to city children if recited from books or told by teachers, but taught through a garden where the children prepare the

soil, sow the seeds, and care for the plants, the lessons cannot be without good results.

During 1917-18-19 we have given instruction each year to about 1,000 pupils from second and third book classes. We find that primary pupils are too young to do gardening in classes and that pupils of fourth book classes, having manual training and household science, have less time for this work than the intermediate grades. It would also seem that the pupil's interest in growing things is at a maximum during the period from 10 to 12 years of age.

ASSIGNING PLOTS

Instead of giving pupils very small individual plots, we give a plot, 22 by 43 feet for vegetables and one, 6 by 20 feet for flowers to each class. This plan has obvious advantages and some disadvantages. It encourages group work and insures that every plot will be properly looked after. It does not call for individual effort as well as the giving of a small plot to each child.

During the war we felt under obligation to devote our main energies to raising food, but flowers have always received some attention. In future we shall probably give them increased space. It has been said that a selfish person cannot cultivate a flower garden. One of two things happen. Either the flowers will not grow under his care or if they do he becomes so changed that his affections expand to embrace a new world. Children love to grow flowers and the school garden presents many opportunities of teaching them to think of others. Putting up flowers for the sick in hospitals gives them practical lessons in social service.

We have five comparatively large schools within walking distance of the school garden. Pupils from three smaller schools have been carried to the garden by street-car. Two of our large schools have small gardens on the school property. To extend our

garden work to all children of second and third book classes we require additional plots of land.

The success of the school garden has been due largely to the earnest and intelligent work of Miss Lapp who has had charge of it during the past three years. She has spared no effort to give the work the highest possible educational value, and at the same time have a garden which would present a creditable appearance. Pupils go to the garden in company with their teachers, the teacher working with the children under Miss Lapp's direction. Without exception, the class teachers have given the garden work every assistance in their power. Many of them are now quite competent to manage garden work without any supervision.

It would be incorrect to infer that the school garden meets with unanimous approval. It would be strange if it did. Many city people have turned their backs upon gardens and farms and weeds and insects. They do not wish to soil their hands with anything that touches Mother Earth. These people may honestly believe that their children will receive more profit from studying a book or from working arithmetic than from planting seeds and pulling weeds. Some have gardens at home and very naturally think their children require no further instruction in what to them is purely a labour and not an educational problem. Others cannot believe that lessons can be taught outside of a class-room. They hold the traditional and conservative view that education consists in the acquisition of facts and logically infer that the facts are most easily acquired by reading books. But on the whole, the objections are few. The majority of parents know that their children are acquiring an interest that may lead to big results.

It would of course be ideal if all pupils had gardens at home. Perhaps in that case the school garden, as such, could not be justified. But less than 50 per cent of our pupils have

plots at home suitable for cultivation. Where such plots are available we are doing everything possible to stimulate an interest in home gardens. During 1918 we formed in the schools thirteen home garden clubs, supplying the pupils with seeds and some plants. The home gardens were managed with a member of the Ottawa Horticultural Society as an official adviser for each club. During 1919 we followed a similar plan except that the school board paid \$40 to each teacher who managed a garden club. Every pupil member of a garden club was required to keep an accurate record of what he planted, when he planted it, when it was ripe, or in bloom, and, when the season was finished, to write a full account of his season's experience. In addition, the teacher in charge made official reports on four different visits to each garden.

PERMANENT OUTDOOR LABORATORY

In this age it is seldom possible to accomplish anything without considerable expense. Gardening is no exception to this rule. We might occasionally secure the use of a vacant lot without rent but our right of possession would be so insecure as to largely destroy the educational value of the garden. To make a good garden requires years of effort and a permanent plot seems to be a first need. We paid more than \$13,000 for our acre plot. This at six per cent means an annual rental of nearly \$800. A farmer or a gardener would tell us that from an economic point of view our annual rental charge is absurd. But from

the same point of view it seems absurd to many people to spend an average of \$60 a year on the education of every child in our public schools. At the present time we cannot build even one school-room or manual training room or domestic science room for \$13,000. Surely an acre of school garden is worth as much for educational purposes as a single class-room.

But aside from the considerable annual charge for interest, a school garden is not an expensive part of the school plant. Three or four hundred dollars a year will buy fertilizer, seeds, plants, and implements. We aim at growing everything possible from seed, and find cold frames a valuable addition to our equipment. Incidentally, it may be of interest to state that the school board is receiving more than \$1,000 a year in government grants for school garden work.

Provision is being made in our garden for a permanent perennial border. Already we have in it many fine specimens of plants, and in time we hope to have a collection of those most suitable for the Ottawa climate. This perennial border serves a two-fold purpose. It gives a succession of bloom, adding to the beauty of the garden from early May when the tulips and daffodils burst forth until late October when the frost cuts down the last perennial aster, and it gives us an opportunity to show the children what they may have in their home gardens. Unless a school garden influences the child to do some home gardening, even though only the growing of a bulb in the window, it has largely been a failure.

SASKATCHEWAN

SUMMER COURSE IN SASKATCHEWAN UNIVERSITY

ARRANGEMENTS have been completed between the Department of Education and the university for the holding of the next summer session for undergraduates and teachers at the University, Saskatoon. The session of 1919 held at the university proved very successful and the Minister of Education has expressed his approval of a continuance of the policy of co-operation that has existed between the department and the university since summer sessions were established.

Courses leading to the bachelor's degree will be offered in animal husbandry, biology, chemistry, field

husbandry, English, Latin, and mathematics. In addition to the special courses in agriculture and science, art, health, education, household science, manual training and music provided for teachers in 1919, the department and the university are co-operating in trying to secure the services of a man of outstanding reputation to give a course of lectures on education. It is felt that such a course would serve as an inspiration, not only to undergraduates of the university, but also to teachers and inspectors who wish to improve their standing along professional lines.

BOYS' AND GIRLS' CLUBS AT THE INTERNATIONAL

REPRESENTATIVES of boys' and girls' clubs from several of the United States attended the International Live Stock show held in Chicago early in December. Delegations from the different states which included both boys and girls consisted of 80 members from Iowa, 28 from Indiana, 19 from Illinois, 17 from Mississippi, 14 from South Dakota, 9 from Wisconsin, 7 from Oklahoma, 7 from Texas, 6 each from Minnesota, Arkansas and Missouri, 4 from New Mexico, 3 from Michigan,

2 from Ontario and 1 each from Idaho, Washington and Florida. Teams of three members representing several of the clubs competed in the junior live stock judging competitions in which cattle, sheep and swine were judged. Besides attending the International Show the boys and girls visited a number of the packing houses, the art institute, the zoological gardens and other points of interest. They were entertained with banquets and theatrical performances.

PART IV

Special Contributions, Report of Agricultural Organizations, Publications, and Notes

ASSOCIATIONS AND SOCIETIES

EVENTS OF THE MONTH

- March 1-5, Manitoba Winter Fair and Fat Stock Show, Brandon; secretary, W. I. Smale, Brandon, Man.
- 1-6, Poultry Show in connection with the Manitoba Winter Fair at Brandon, Manitoba; secretary, W. F. McGuinness, Brandon, Man.
- 2, Victoria County Pure Bred Stock Association Sale at Lindsay, Ontario.
- 3, Guelph Fat Stock Club Sale of Shorthorns, Guelph; secretary, J. M. Duff.
- 2-3, Annual meeting of the Alberta Horse Breeders' Association, secretary, E. L. Richardson, Calgary.
- 2-3, Annual meeting of the Alberta Swine Breeders' Association, secretary, E. L. Richardson, Calgary.
- 4-5, Breeder's sale of Clydesdale, Percheron, Shire, and Belgian stallions, mares colts, and fillies at the Union Stock Yards horse exchange, Toronto; Walter H. Smith, manager.
- 10, Caledonia Shorthorn Breeders' Club annual sale of Shorthorns.
- 10, 11, 12, Saskatchewan Cattle Breeders' Association annual sale, Regina; secretary, J. G. Robertson, Live Stock Commissioner, Department of Agriculture, Regina.
- 16, London district Holstein Breeders' Club sale at London, Ont.
- 16-19, Sixth annual convention of the Women's Institutes of Alberta will be held in the auditorium of the First Baptist Church, Edmonton; Miss Mary MacIsaac, supervisor, Edmonton, Alta.
- 17-18, Fourteenth annual sale of pure-bred bulls, under the auspices of the Cattle Breeders' Association of Manitoba, will be held at Brandon, Man.; secretary, W. I. Smale.
- 23-26, Twentieth annual auction sale and show of pure bred bulls, beef breeds only, under the auspices of the Alberta Cattle Breeders' Association, at Calgary, Alta.; secretary, E. L. Richardson, Victoria Park, Calgary.
- 24, Perth Breeders' Holstein Club sale at Stratford, Ontario.
- 24-25, Auction sale of pure-bred cattle at the Winter Fair arena, Brandon; secretary, W. I. Smale, Brandon, Man.
- 24-25, Annual sale of pure bred live stock and grade horses to be held at Carman, Man., by the Dufferin Agricultural Society.
- 29-April 3, Edmonton Spring Live Stock Show; manager, W. J. Stark, Edmonton.
- 30, Ninth annual auction sale and show of pure bred bulls in the stock pavilion, Exhibition Grounds, conducted jointly by the Edmonton Exhibition Association and the Alberta Cattle Breeders' Association; secretary, W. J. Stark, Box 216, Edmonton, Alta.
- April 1, Norfolk Holstein Club sale at Hagersville, Ont.
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FIRST CONVENTION, FEDERATION OF WOMEN'S INSTITUTES OF CANADA

A convention that opened the way to unlimited possibilities in the uniting of women was held in Toronto, Ont., in November, 1919. The first step in this direction had already been accomplished by the federation of the Canadian provinces, and another step was taken when the convention decided on forming an alliance with the Federated Women's Institutes of Great Britain upon the request from the Motherland presented by Mrs. Alfred Watt. A wider hope was expressed and is entertained that at the meeting of directors at St. Anne de Bellevue in September this year there will be a culmination of the international federation. By this means the strength of Belgium and the United States would be added to the women's institute movement.

The growth of the women's institute movement, which began at Stony Creek, Ont., and has spread over Canada until its membership reaches almost 100,000, was strongly evidenced. A significant feature was that it is the first convention in the history of women's national organizations of Canada when a western executive has met in an eastern city. Only two national Canadian women's organizations have their executive in the West and Judge Emily Murphy is the president of both, the other organization being the Canadian Women's Press Club. Representatives were present from eight provinces of the Dominion and one from England, and each representative was a personality. The following is a brief outline of the objects of the federation which are set forth in the constitution:—

(1) To co-ordinate the various provincial women's institutes and kindred organizations throughout the Dominion.

(2) To act as a clearing house for activities of the various federated organizations.

(3) To raise the standard of homemaking.

(4) To develop agriculture.

(5) To promote educational, moral, social, and economic measures.

(6) To encourage co-operation and community efforts.

(7) To initiate nation-wide campaigns in accordance with the objects of the federation.

Resolutions regarding the following matters were among the more important ones passed at the convention:—

1. Protecting the bird life in Canada.

2. Starting a campaign in securing one set of words and music for the national anthem "O Canada."

3. Safeguarding of women and children while travelling. The railroads will be approached on this matter.

4. Placing of whole wheat flour on the market again.

5. Inspecting the sources of our milk supplies, as it was found in various parts of the country this had been the cause of the spreading of epidemics.

The constitution provides that the presidency shall alternate between eastern and western Canada.

CANADIAN CO-OPERATIVE WOOL GROWERS' ASSOCIATION

The annual meeting of the Co-operative Wool Growers', Limited was held in Toronto on February 6. There were present shareholder delegates from every province in Canada. It was reported that the manager, Mr. Reginald Arkell, owing to ill health, had resigned. It was proposed at the meeting to build an additional story to the wool warehouse erected last year at Weston, and to

build a wool warehouse at Lennoxville, where Quebec wool will be collected and made ready for marketing. The amount of wool handled in 1919 was reported to be 4,095,874 pounds. The president of the Association is Lt.-Col. Robt. McEwen, Byron, Ont., 1st vice-president, J. D. Wilson, Forres, Sask.; 2nd vice president, H. A. Logan, Amherst, N.S.; manager, G. E. O'Brien, Toronto.

CANADIAN LIVE STOCK ORGANIZATIONS

The annual meetings of the Canadian Live Stock Associations were held in Toronto during the week commencing February 2nd. Enthusiasm and optimism prevailed throughout the meetings. The transactions of these organizations through the National

Live Stock Records are shown in the following tables. The pedigrees and transfers recorded cover a period of five years, and from this may be observed the steady increases from year to year.

PEDIGREES AND TRANSFERS RECORDED DURING THE PAST FIVE YEARS.

Association	Pedigrees Recorded					Transfers Recorded				
	1915	1916	1917	1918	1919	1915	1916	1917	1918	1919
Aberdeen.....	1255	1431	2567	3841	4642	797	1103	1448	1849	2412
Ayrshire.....	3682	4000	4368	4475	4843	1407	1976	3205	3847	3920
Belgian.....	76	131	241	508	539	96	94	169	245	209
Brown Swiss.....	432	270	57	214	140	4	23	25	23	38
Clydesdale.....	2555	3132	3885	3526	3397	2255	3266	3715	3819	2941
Dogs.....	877	1542	1661	2628	3039	183	1224	1428	1477	1781
Can. Cattle.....	319	268	327	351	389	124	141	199	188	210
French Coach.....	10	7	2	4	1	14	10	5	7	10
Can. Horse.....	85	64	52	53	39	51	30	23	28	27
Galloway.....	63	30	19	111	104	22	45	6	52	18
Goats.....				230	67				41	54
Guernsey.....	230	146	183	159	261	39	88	55	62	121
Hackney.....	128	94	77	93	80	142	132	123	122	112
Hereford.....	2147	3207	5353	5228	4144	769	1087	1971	3149	3401
Jersey.....	1065	1308	1703	1519	1819	887	1014	1151	1297	1681
Percheron.....	825	1323	2304	3597	3209	493	642	913	1161	1175
Pony.....	67	69	40	68	63	31	32	25	23	46
Red Polled.....	80	477	331	294	302	45	52	94	63	141
Sheep.....	6019	7958	8411	10255	10118	1376	2509	3874	4574	6157
Shire.....	93	121	158	178	157	79	107	149	112	112
Shorthorn.....	11135	14333	16863	17400	24500	5063	6987	9414	11859	13185
Standard Bred.....	319	382	324	289	282	157	192	164	252	214
Suffolk.....	35	28	34	31	16	13	32	37	21	22
Swine.....	9718	13594	12204	14858	15287	1507	3493	9270	11780	11927
Thoroughbred.....	219	151	158	177	157	59	91	89	59	85
Totals.....	41434	54066	61322	70096	77595	15613	24370	37552	46110	49999

MEMBERSHIP OF RECORD ASSOCIATIONS, 1919

	Ont.	Man.	Sask.	Alta.	B.C.	Que.	N.B.	N.S.	P.E.I.	U.S.	G.B.	Nfd.	Totals.
Canadian Aberdeen Angus.....	145	78	106	111	5	4	1	3	3				456
Can. Ayrshire Breeders' Ass'n.....	505	27	48	65	45	901	51	66	33	9		4	1754
Can. Belg. Draft Horse Ass'n.....	3	6	39	24		14				1			87
Can. Brown Swiss Ass'n.....	9		1			13	1						24
Clydesdale Horse Ass'n.....	950	305	425	261	31	50	11	7	5	1			2048
French Can. Cattle Breeders'.....	1	1				150	1						153
Can. French Coach Breeders'.....			2	10									12
French Can. Horse Breeders'.....	1					99							100
North Am. Galloway Ass'n.....	2	4	5	5									16
Can. Goat Society.....	12	2	2	4	38	1	1	1					61
Can. Guernsey Breeders' Ass'n.....	7				20	7	2	38	5				79
Can. Hackney Horse Society.....	59	7	8	24	4	12	1	1		5			121
Can. Hereford Breeders' Ass'n.....	246	96	161	220	7	10		6	1	18			765
Can. Jersey Cattle Club.....	257	19	18	19	93	75	17	20	4	6			528
Can. Kennel Club.....	854	102	111	92	137	192	19	12	1	29			1549
Can. Perch. Horse Breeders'.....	110	86	222	267		17	2	3	3		1		710
Can. Pony Society.....	31	2	7	6	2	10							58
Can. Red Polled Ass'n.....	3	16	19	19	7			1					66
Can. Sheep Breeders' Ass'n.....	484	86	117	131	26	435	31	27	38	18			1393
Can. Shire Horse Ass'n.....	21	9	9	28	4								71
Dom. Shorthorn Breeders'.....	2126	497	465	493	31	113	25	46	27	7			3830
Can. Stand. Bred Horse Soc.....	67	9	32	24	6	17	3	2	2				162
Can. Suffolk Horse Soc.....	1	4	6										11
Can. Swine Breeders' Ass'n.....	633	278	551	490	99	544	47	21	26				2668
Can. Th bred Horse Soc.....	68	2	8	18	4	13							113
Totals.....	6595	1636	2362	2320	559	2647	212	252	150	98	1	4	16836

CLYDESDALE HORSE ASSOCIATION

It was announced by the directors of the Clydesdale Horse Association that fourteen high-class Clydesdale geldings were exported to Glasgow and sold for a little more than \$800 each. The membership was reported to be 2,077. Resolutions were passed asking Fair Boards to increase prizes for live stock inkeeping with the greatly increased cost of making exhibits; asking the Dominion Government to take steps to prevent the

bringing in of grade or scrub stallions as settlers' effects; endorsing plan for developing a winter fair at Chatham, Ont., and appointing representatives to the Royal Agricultural Winter Fair; recommending to the directors that grants to fairs in Alberta be turned over to the Alberta Clydesdale Association for allotment as an experiment for this year only. The following officers were elected: President, Jas. Torrance, Markham, Ont.; vice-president, Fred. Richardson, Columbus, Ont.; vice-presidents for provinces: On-

tario, Peter Christie, Manchester; Maritime Provinces, S. A. Logan, Amherst, N.S.; Quebec, Robert Ness, Howick; Manitoba, John Graham, Carberry; Alberta, E. D. Adams, Calgary; Saskatchewan, Thos. E. Sanderson, Turtleford; British Columbia, Wm. Montgomery, Ladner; secretary, J. W. Wheaton, Toronto.

CANADIAN SHIRE HORSE ASSOCIATION

At the meeting of the Canadian Shire Horse Association the following officers were elected: President, Jas. Bovaird, Brampton; vice-president, G. D. Morden, Oakville; secretary-treasurer, G. de W. Green, Toronto.

CANADIAN PONY SOCIETY

The Canadian Pony Society elected officers as follows: President, J. M. Gardhouse, Weston; vice-president, Dr. Fowler, Toronto; secretary-treasurer, G. de W. Green, Toronto.

CANADIAN HACKNEY BREEDERS' SOCIETY

The Canadian Hackney Breeders by resolution endorsed the proposal to hold a Winter Fair at Chatham and asked Fair Boards to increase prizes for Hackney horses. The following officers were elected: President, W. E. Jewell, Bowmanville; vice-president, Dr. Fowler, Toronto; secretary-treasurer, H. M. Robinson, Toronto.

CANADIAN STANDARD-BRED HORSE ASSOCIATION

The directors were given authority by the association to make grants to the Canadian National Winter Fair, Toronto, and the Central Canada Winter Fair at Ottawa for a trotting race for colts and fillies three years old and under. The following officers were elected: President, Sam. McBride, Toronto; vice-president, F. S. Scott, M.P., Galt, Ont. secretary-treasurer, John W. Brant, Ottawa,

CANADIAN THOROUGHBRED HORSE ASSOCIATION

The Canadian Thoroughbred Horse Society endorsed the holding of a Winter Fair at Chatham and recommended grants from the society for horses of Thoroughbred breed at that show.

The following officers were elected: President, John J. Dixon, Toronto; vice-president, A. E. Dymont, Toronto; second vice-president, R. W. Davies, Toronto; secretary-treasurer, T. J. Macabe, Toronto.

DOMINION SHORTHORN BREEDERS' ASSOCIATION

The Dominion Shorthorn Breeders' Association declared their intention to strongly support the Royal Agricultural Winter Fair.

It was decided to engage a publicity field man in the western provinces. It was also decided to increase the prize money won by exhibitors in certain specified sections by fifty per cent provided the Exhibition Association offers as much of its own money in prizes for Shorthorns as for any other beef breed. A sum of two hundred dollars was voted towards the erection of a Memorial Hall at the Ontario Agricultural College. The following officers were elected: President, J. G. Barron, Carberry, Man.; first vice-president, H. M. Pettit, Freeman, Ont.; second vice-president, Hon. Duncan Marshall, Olds, Alta.; secretary-treasurer, Professor G. E. Day, Guelph.

CANADIAN AYRSHIRE BREEDERS' ASSOCIATION

The Ayrshire Breeders' Association decided to raise the fees for record pedigrees and transfers. Resolutions were passed urging upon the larger exhibition boards to provide stables for the isolation of herds that had entered the Accredited Herd System; asking the Federal Department of Agriculture to modify the rules in the Record of Performance: (a) By eliminating the fifteen-month freshening period; (b) by establishing an only rule for a 305-day test with a freshening period of four hundred days; (c) that the standard of butter fat in the Record of Performance test be increased from 3.6 to 3.8; that provision be made for the suspension of members who are exceedingly tardy in supplying registration papers for cattle sold. The following officers were elected: President, Gilbert MacMillan, Huntingdon, Que.; vice-president, Wm. Hunter, Freeman, Ont.; secretary-treasurer, F. W. Stephen, Huntingdon, Que.

HOLSTEIN BREEDERS' ASSOCIATION

The Holstein Friesian Association authorized the spending of thirty thousand dollars in providing a suitable record building. General satisfaction was expressed over the successful completion of the arrangements for reciprocity in registration between the American and Canadian associations. It was decided to increase the fees for pedigree transfers. The following officers were elected: President, Neil Sangster, Ormstown, Que.; first vice-president, F. R. Mallory, Frankford, Ont.; second vice-president, A. E. Hulet, Norwich, Ont.; third vice-president, R. W. E. Burnaby, Jefferson, Ont.; fourth vice-president, R. F. Hicks, Newton Brook, Ont.; secretary, W. A. Clemons, St. George, Ont.

CANADIAN JERSEY CATTLE CLUB

The Jersey Cattle Club agreed to change the date of the annual meeting to correspond with those of the Royal Winter Fair. Increased grants to exhibitions for Jersey cattle were decided upon. It was decided

to make a charge of one dollar for each volume of the Herd Book that has heretofore been given free to members. The following officers were elected: President, J. L. Alexander, Hillhurst, P.Q.; vice-presidents, Geo. Bagg, Edgeley, Ont., Gordon D. Duncan, Todmorden, Ont.; secretary, Bartley Bull, Brampton, Ont.

CANADIAN HEREFORD BREEDERS' ASSOCIATION

The secretary of the Hereford Breeders' Association announced an increase in membership of almost five per cent during the past year. It was decided to double the fees for the registration and transfer of pedigrees. The following officers were elected: President, L. O. Clifford, Oshawa, Ont.; vice-president, W. H. Hunter, Orangeville, Ont.; secretary-treasurer, H. D. Smith, Ancaster, Ont.

CANADIAN SHEEP BREEDERS' ASSOCIATION

The Canadian Sheep Breeders Association by resolution urged that the administration

of the laws concerning the inspection and sale of feed stuffs be transferred from the Department of Health to the Department of Agriculture; that a start be made to secure reciprocity in registration with the United States record association for the various breeds of sheep recorded in Canada; urging that all pure bred sheep sold in Canada be registered in the Canadian Live Stock Records. The following officers were elected: President, W. A. Dryden, Brooklin, Ont.; secretary, R. W. Wade, Parliament Buildings, Toronto, Ont.

CANADIAN SWINE BREEDERS' ASSOCIATION

The resolutions passed by the Canadian Sheep Breeders' Association relative to the administration of the feed stuffs law was also passed by the Swine Breeders' Association. The following officers were elected: President, J. F. Roach, Sussex, N.B.; secretary, R. W. Wade, Toronto, Ont.

ONTARIO LIVE STOCK ASSOCIATIONS

The annual meetings of the Ontario Live Stock Associations were held in Toronto during the week commencing Feb. 2.

ONTARIO HORSE BREEDERS' ASSOCIATION

The Ontario Horse Breeders' Association passed a resolution asking for the registration and licensing of veterinary surgeons. The following officers were elected: President, J. A. Boag, Queensville; secretary, R. W. Wade, Toronto.

ONTARIO CATTLE BREEDERS' ASSOCIATION

The most important topic discussed by the Ontario Cattle Breeders' Association was the campaign now being carried out co-operatively by the federal and provincial departments of agriculture to eliminate the scrub sire.

ONTARIO SHEEP BREEDERS' ASSOCIATION

The Ontario Sheep Breeders' Association urged the raising of the bounty paid for the destruction of wolves which were hindering the development of the sheep industry in New Ontario and that the law relating to the dog nuisance should be more strictly enforced.

The following officers were elected: President: Geo. L. Telfer, Paris; vice-president, E. Robson, Denfield; secretary-treasurer, L. E. O'Neill, Department of Agriculture, Toronto.

ONTARIO SWINE BREEDERS' ASSOCIATION

The Ontario Swine Breeders' Association urged by resolution a more stringent administration of the Feed Adulteration Act and its transfer to the Department of Agriculture. The following officers were elected: President, Wm. James, Mount Elgin; secretary-treasurer, L. E. O'Neill, Department of Agriculture, Toronto.

ONTARIO RANCHERS' ASSOCIATION

The Ontario Ranchers' Association was organized at a meeting composed of sheep and cattle ranchers living in the northern part of the province. The ranching situation in the province was reviewed by Mr. C. M. Laidlaw, Ranch Specialist and secretary-treasurer of the association. The following officers were elected: President, F. C. Patterson, Powasson; vice-president, Jas. Fennessy, Renfrew, secretary-treasurer, C. M. Laidlaw, Burwash.

ONTARIO PLOUGHMEN'S ASSOCIATION

The annual meeting of the Ontario Ploughmen's Association was held in Toronto early in February. The following officers were elected: President, J. E. Wilson, Berrytown;

first vice-president, D. D. Gray, Experimental Farm, Ottawa; second vice-president, A. B. Rose, Echoplace; secretary-treasurer, Frank P. Johnston, Toronto.

ONTARIO FAIRS' ASSOCIATION

The annual meeting of the Ontario Winter Fairs Association was held in Toronto at the beginning of February. The following officers were elected: President, L. J. C. Bull, Brampton; first vice-president, W. J. Con-

nolly, Cobden; second vice-president, John Farrell, Forest; secretary and editor, J. Lockie Wilson, Toronto; treasurer, J. E. Peart, Hamilton.

ONTARIO HORTICULTURAL ASSOCIATION

At the fourteenth annual meeting of the Ontario Horticultural Association which was held in Toronto early in February it was clearly brought out that the horticultural industry was suffering seriously from the shortage of trained gardeners.

Resolutions were passed asking the executive of the association to appoint a committee to select judges for horticultural exhibitions; requesting that a sum of money be set aside for the preparation of a set of horticultural

lantern slides; urging the government to prevent the carrying and using of guns by boys and young men during the breeding season for birds; making the affiliation fee \$2 for the first two hundred members or less and \$1 for each additional one hundred or portion thereof up to one thousand members; recommending the establishing of special facilities for the training of men for horticultural work.

PRINCE EDWARD ISLAND EGG AND POULTRY ASSOCIATION

When the P.E.I. Egg and Poultry Association first began their co-operative business six years ago, they started by organizing egg circles in different centres throughout the province, each circle marketing its own eggs. Before one year had passed, they found that to exist, they must have a central plant to candle the eggs and control the quality of their output. To do this, it was necessary to supply funds to make advances to the patrons. Collateral notes were used for the purpose of raising funds and the system has worked well. The quality of their eggs improved steadily until to-day Prince Edward Island eggs lead in the Canadian market.

Having established their central plant, they found that they could further serve the needs of their members by killing and marketing their poultry. The average quality of the poultry was very poor and they realized that to become successful as poultry raisers, they must improve the quality of their product. A campaign to this end was carried on and when the quality of the poultry killed last year was compared with that of the first year, the result has been truly remarkable. Thus, they have developed their business from step to step until at the beginning of the year that is just passed, their business included a selling department which distributed staple necessities such as seeds, fertilizer, binder twine,

Paris green and mill feeds. During the year, they extended their selling branch by marketing potatoes for the members. They have been reasonably successful in this branch also, having handled about 26,000 bushels, and they are prepared to continue in the potato business. Retail stores have been organized at country points that are proving a useful medium in collecting eggs and produce and in distributing supplies.

They also established a chick hatchery to supply members with day-old chicks, hatched from eggs obtained from the best pure-bred flocks in the province. By this means of incubation, they were able to distribute to members who applied for the same, 5,447 day-old chicks hatched from 11,305 eggs. The eggs were bought for \$5 per hundred and chicks delivered to farmers for \$18 per hundred. To do this, two incubators with a capacity of 2,440 eggs each, were bought and are now the property of the Association. The effect of this distribution of good young stock among the members greatly improved the quality of the poultry marketed last fall. In connection with the chick hatchery, valuable assistance was given by the Department of Agriculture. They supplied a man and provided the Agricultural Hall for a hatchery station.

PRINCE EDWARD ISLAND DAIRYMEN'S ASSOCIATION

The president of the Prince Edward Island dairymen in his opening address declared that "the dairy cow has caught up to the black fox as a money maker in Prince Edward Island". The summarized report shows that dairying is decidedly on the increase and that large centralizing cream-

eries are to take the place of the smaller factories who find it impossible to compete owing to the labour problems and the cost of adequate machinery and appliances. The dairy instructor recommended that the educational system in the province should be remedied in order that butter makers and

cheese makers might be trained, and he suggested a properly equipped dairy school at Truro, N.S. where a combined course might be provided for the people of the

Maritime provinces. The manufacture of both butter and cheese are on the increase in Prince Edward Island.

MARITIME STOCK BREEDERS' ASSOCIATION

The annual meeting of the Maritime Stock Breeders' Association was held in Truro, N.S., on January 8. The need of maritime stock yards, abattoirs and cold storage plants for the Maritime Provinces was discussed. Owing to the exceptionally bad freighting service the maritime breeders have been receiving, a resolution was passed

protesting against further financial loss and injury due to the carelessness of railway employees.

The election of officers resulted as follows: president, A. E. Trites, Salisbury, N.B.; secretary, Fred L. Fuller, Truro, N.S.; and four directors for each of the Maritime Provinces were also elected.

NOVA SCOTIA FRUIT GROWERS' CONVENTION

The fifty-sixth annual convention of the Fruit Growers Association of Nova Scotia was held in Kentville, N.S. during the third week in January. Among important matters considered was the matter of applying for legislation which would compel manufacturers to make a standard barrel in which to pack apples, the measurements to conform in all particulars to the present law being 64 inches around the bulge, 28½ inches in length

and 17½ inches in diameter.

The officers elected for the year are president, V. B. Leonard, Centre Clarence; vice-president, M. K. Ells, Port Williams; secretary, Frank Foster, Kingston; treasurer, Professor Blair, Kentville. Mr. Frank Foster was selected to represent the fruit growers at the shippers' association meeting, in the hope of securing better and cheaper transportation for fruit.

NOVA SCOTIA DAIRYMEN'S CONVENTION

The seventh annual convention and creamery butter exhibition of the Nova Scotia Dairymen's Association was held at the Agricultural College, Truro, on January

22nd and 23rd. The officers elected are president, J. D. McKenzie, Bridgewater; vice-president, R. B. McLennan, Truro; secretary treasurer, W. A. MacKay, Truro.

NEW BRUNSWICK DAIRYMEN UNITED

The New Brunswick Dairymen United held their first annual convention and dairy show in Sussex, N.B., on December 3rd and 4th, 1919. A fair attendance of representatives from the cheese factories and creameries were on hand and considerable interest was shown in the cheese and butter exhibit, which consisted of representative samples from

practically all of the cheese factories and creameries in the province, selected at random from the June, July, August and September makes.

The following officers were elected:—

A. E. Trites, Salisbury, president; F. G. Hughson, Cornhill, vice-president; H. W. Coleman, Sussex, secretary treasurer.

QUEBEC SOCIETY FOR THE PROTECTION OF BIRDS

The annual meeting of the Province of Quebec Society for the Protection of Birds was held in the Windsor Hotel, Montreal, January 12th. The reports of the year's work showed that nine monthly meetings had been held and subjects relative to bird life were treated at each. The society has been carrying on educational work among the school children and is co operating with the Boy Scouts in an effort to protect our native birds. The bird sanctuaries established in the cemeteries have been added to by a number of bird nesting boxes,

and in conjunction with the Quebec government further work has been done in establishing sanctuaries in suitable places throughout the province.

The officers for the following year are,—Hon. President, Mr. K. Gammell; President, Mr. L. M. Terrill; vice presidents, Mr. Fred Abraham, and Mr. Napier Smith; corresponding secretary, Mrs. W. E. L. Dyer, 12 Willow Ave., Westmount, Que.; recording secretary, Miss Jean McConnell; secretary-treasurer, Miss Mary Armitage.

BEDFORD DISTRICT AYRSHIRE BREEDERS' CLUB

At the annual meeting of the Bedford District Ayrshire Breeders' Club, held at Foster, Que., on January 21st, Mr. W. F. Stephen, Secretary of the Canadian Ayrshire Breeders' Association, advised breeders to fit and show their herds at the exhibitions

and enter into the accredited herd system organized by the Health of Animals Branch of the federal Department of Agriculture. Mr. J. E. Jackson, Brome, Que., was elected president of the Club.

DAIRYMEN'S ASSOCIATION OF WESTERN ONTARIO

At the annual meeting of the Western Ontario Dairymen's Association held in London, Ontario, in January the following officers were elected, President, W. G. Medd, Exeter; vice-presidents, J. Scott, Woodstock; Geo. Taylor, Guelph; J. N. Allen, Dunnville; secretary-treasurer, Frank Hens, London, Ont.

The association expressed themselves as being in sympathy with the plan for the butter grading service put into effect by the Dairy Branch of the Ontario Department of

Agriculture. They approved of the weekly market letters and telegrams sent out from the Dairy Branch of the federal Department of Agriculture and suggested that this plan be continued and that the regular news letter also be included. It was advocated that some regulation should be enacted which would insure the removal of all previous marks from butter boxes and that the re-use of second-hand butter boxes should be discouraged.

WESTERN ONTARIO WINTER FAIR ASSOCIATION

The Western Ontario Winter Fair Association was organized at a meeting held in Chatham on January 24th. Although a winter fair for the western part of Ontario has been discussed for some years definite action was not decided upon until the recent corn show at Chatham. The financial question now appears to be the most difficult

but it is expected that the various county councils will be approached and that arrangements will shortly be completed. The president of the new fair association is J. O. Duke, Ruthven, Ontario and the secretary is P. L. Fancher, B.S.A., Corn Specialist, Chatham, Ontario.

ONTARIO CORN GROWERS' ASSOCIATION

Two important resolutions were passed at the annual meeting of the Ontario Corn Growers' Association. One was in reference to an experimental station for south-western Ontario where experiments in the culture of various crops, especially corn, might be carried on for the benefit of the large corn growing area in the south-western counties of Ontario. The association also favoured the carrying on of experimental work with commercial fertilizers on corn with the view to publishing the information gained from them. A large amount of commercial

fertilizer is used annually in that section of Ontario and many questions arise as to its use for corn, but as yet there are no accredited official experiments carried on in Ontario to ascertain its effect on corn.

The officers for the present year are: Honourary President, Lester Gregory, Chatham; president, Walter Anderson, Amherstburg; vice presidents, Stewart McDonald, Fort Lampton and Frank Weaver, Turnerville; treasurer, J. H. Coatsworth, Kingsville; secretary, P. L. Fancher, Chatham.

THE ONTARIO AGRICULTURAL AND EXPERIMENTAL UNION

The forty-first annual meeting of the Ontario Agricultural and Experimental Union was held at the Ontario Agricultural College, Guelph, on January 20th and 21st. During the period that the Union has been in operation 94,703 distinct co-operative tests have been made on farms throughout the province. Each of these tests consisted of from two to

ten plots. The number of tests carried on last year were 2,468.

The following officers were elected: president, H. K. Revell, Goderich; vice-president, J. B. Spencer, Ottawa; secretary, Dr. C. A. Zavitz, O.A.C.; assistant secretary, Prof. W. J. Squirrell, O.A.C.; treasurer, A. W. Mason, O.A.C.

MANITOBA STOCKMEN'S ASSOCIATION

The several live stock associations of Manitoba met at Brandon in January for their annual conventions. The Presidents elected for the coming year were as follows: Manitoba Horse Breeders' Association, John Crawford; Clydesdale Club, W. McKirdy, Napinka; Cattle Breeders' W. F. Collier, Welwyn; Hereford Club, J. A. Chapman, Hayfield; Swine Breeders', W. C. McKilican, Brandon; Sheep Breeders', George Gordon, Oaklake.

Many matters of importance were taken up at this meeting. The executive of the Cattle Breeders' Association have decided

to take action to establish the operation of an "association car" from Manitoba west. They expressed their approval of the action of the federal Department of Agriculture in instituting the accredited herd plan in Canada and pledged their co-operation with the inspectors in charge for the successful application of the Act.

The Sheep Breeders' urged that legislation be enacted with reference to live stock records and all sheep sold as pure breeds in Canada and that certificates of registration be furnished at the time of the sale.

BRITISH COLUMBIA BEEKEEPERS' ASSOCIATION

At the annual meeting of the lower mainland division of the Beekeepers' Association of British Columbia the following officers were elected for the ensuing year:—Hon. President Hon. E. D. Barrow; president, Wm. Hugh

Cloverdale, vice-president, Wilfred M. Smith, Dewdney, B.C.; secretary-treasurer, John Brooks, 654 24th ave., W., Vancouver, B.C.

GRADING OF BUTTER

In Canada, there is more or less grading of butter by the provinces of Alberta, Saskatchewan, Manitoba, Quebec and Ontario. In New Brunswick the grading of cheese was carried on last season and this year butter will be graded under the same system. In Nova Scotia there is no grading but there has been discussion regarding it and a committee will report on the subject at their dairy convention next winter. In British Columbia there is no grading but next summer the local Department of Agriculture will carry on educational butter grading. Cold storage space will be secured in Vancouver, Victoria and

Vernon and buttermakers in these districts may ship in samples as often as they please and these will be graded, scored and reported on. So far as export grading is concerned the biggest system that Canada has ever had was carried on at Montreal by the Dairy and Cold Storage Branch during the past three years when all the cheese exported in 1917, 1918 and the greater part exported in 1919 were inspected and placed in grades 1st, 2nd or 3rd, with half a cent difference in price for each grade. The butter that was bought by the Commission in 1918 was similarly graded.

NEW PUBLICATIONS

DOMINION

Report of the Dominion Experimental Farms for the fiscal year ending March 31, 1919. This is the thirty-second annual report of the work carried on by the Experimental Farms Branch of the federal Department of Agriculture during the year ending March 31, 1919. It has been prepared in such a way that it will be found readable and it gives a very general idea of the lines of activity pursued.

Warble Flies, Bulletin No. 27, Scientific Series, by S. Hadwen, D.V.Sc., is published by the Health of Animals Branch, Department of Agriculture, Canada. This bulletin deals with the warble fly, *Hypoderma lineatum* and *H. bovis*. It covers experiments carried on during the past five years and embraces the reports issued from time to time by the author.

QUEBEC

The Use of Honey in Cooking. Circular No. 39, 4th Series, issued by the Department of Agriculture for Quebec contains numerous valuable recipes regarding the use of honey in cooking.

House Plants and Flowers, Circular No. 40, issued by the Department of Agriculture, Quebec, is a new publication which gives cultural directions for the growing of house plants, and annuals and perennials for the garden. It contains a concise table giving the names of the plants and other information necessary for the successful growing of the same.

Report of the Minister of Agriculture of the Province of Quebec, 1919. This report covers the agricultural activities of all kinds in the province of Quebec, including

the reports of the agricultural schools at LaTrappe and Ste. Anne de la Pocatière, and of Macdonald Agricultural College at Ste. Anne de Beilevue.

Breeders Guide, Bulletin No. 52, issued by the Department of Agriculture of the province of Quebec gives in both French and English information regarding breeders and breed societies of the province. The bulletin contains excellent information on dairy records, feeds and rationing of animals.

ONTARIO

Sheep, Bulletin 274 by Professors Toole and Sackville is a concise work on sheep husbandry. It deals with all breeds which prove suitable in Canada and gives information regarding their care, feeding, breeding and management, including prevention and treatment of diseases.

Farm Management—Part I The Dairy Farming Business in Western Ontario, second survey is Bulletin 275 of the Ontario Department of Agriculture prepared by Arch. Leitch and J. C. Neale. This bulletin records the findings of the second survey made in western Ontario. It gives the method of collecting data together with factors influencing the labour income. A part of the bulletin is devoted to the subject of milk production costs.

Women's Institute Leaflet, Circular No. 25, contains a summarized report of the eastern, western and central Ontario conventions together with resolutions passed

and officers appointed to the provincial federation.

Crop Bulletin 141 of the Ontario Department of Agriculture, Statistics and Publications Branch, gives the areas in crop and the number of live stock in the various counties of Ontario. It also contains a table of the weather for 1919 compared with that of 1918 and the average of the preceding thirty-seven years.

BRITISH COLUMBIA

Loganberry Culture, Circular No. 54, New Horticultural Series issued by the Horticultural Branch of the Department of Agriculture of British Columbia deals in full with the cultivation of the loganberry, its prospects in British Columbia, origin of the variety, suitable districts propagation, insect pests and diseases, etc., and gives the estimated cost of planting an acre together with the estimated gross receipts after the second year.

Rose Culture, Circular No. 58, New Horticultural Series, Horticultural Branch Department of Agriculture of British Columbia is a circular dealing with the culture of roses, in considerable detail. It gives a list of satisfactory garden roses for British Columbia with a note regarding each.

Proceedings of the Entomological Society, No. 12, Systematic Series contains the proceedings of the Seventeenth Annual Meeting of the Entomological Society of British Columbia which was held in Victoria, B.C., in February, 1918.

NOTES

Approximately 1,000,000 acres of free lands in the western Canadian provinces were taken up by returned soldiers last year.

In Canada there are 4,100 cheese factories, creameries, cream factories, condensaries, and milk product plants.

The prize lots of cheese at the Eastern Ontario Dairymen's Association exhibited secured from 97 to 99 points each, which is an excellent attainment.

The Manitoba Grain Growers' Association has been changed in name to the United Farmers of Manitoba. The principles of this body however remain the same.

A dairy course lasting eight weeks was conducted by the dairy department of the University of Saskatchewan during January and February.

The Vocational School at Woodstock, N.B., was formally opened on January 20. Agriculture, home-making and manual training are among the major courses taught at this school.

Macdonald College has been selected as the place where the tractor ploughing demonstration will be held this year by the Eastern Ontario and Western Quebec Ploughmen's Association.

A commission of French dairy experts is making a tour of dairy farms of Canada and the United States purchasing 3,000 head of cattle for foundation herds in the devastated areas of France.

The women's institute of Ribstone, Alberta, conducted the fall fair in that locality last year. It was a decided success. This appears to be a new line of activity for women's institutes.

The business or financial side of farming is taking on a new interest in municipalities where rural credit societies have been formed in Manitoba. This feature alone makes this form of short term rural credits of singular importance.

Peel county home economics and agricultural school held at Cheltenham celebrated the last day of the course with appropriate closing exercises consisting of an entertaining programme and excellent addresses by outside speakers.

The Saskatchewan Cattle Breeders' Association will hold a public auction sale of pure bred cattle of the beef breeds in Regina, on March 10, 11 and 12. Aberdeen-Angus cattle will be sold on the 10th, Herefords on the 11th and Shorthorns on the 12th.

In Douglas County, Nebraska, the Boys' and Girls' Bee Club has been successfully carried on under the direction of a county agent. This is rather a novel activity for boys and girls of school age, but the honey industry holds out great inducements for careful and systematic workers.

England is paying \$6.20 per hundred pounds of milk, and 50 cents per pound of cheese to her farmers in order that they may produce enough for herself; but the cheese is sold to the consumer for 36 cents thus she burdens the tax payer to the extent of 14 cents per pound.

A collection of various "helps" including extracts, clippings, pamphlets, booklets, leaflets and manuscripts is assembled at Macdonald Institute, Guelph and is at the disposal of womens' institutes who frequently receive assistance from them in the preparation of papers for their meetings.

In Saskatchewan both the Department of Agriculture and the rural municipalities have discontinued paying bounties except on timber wolves and coyote pups. The price of these skins is now so high that it is not considered necessary or advisable to offer a bounty for the pelt of adult coyotes.

The average yield of potatoes per acre for Canada in 1919 was 160.75 bushels. The average yield of crops grown by four farmers in the neighbourhood of Bridgewater, Lunenburg county, N.S., was 475 bushels per acre. These four men were the prize winners in the Field Crops Competition in western Nova Scotia last year.

Mr. Alexander Houston, Chief Inspector for the Municipal Department of the Government of Saskatchewan, has been appointed Superintendent of the Boys' Detention Home at Regina. Eleven years ago he was appointed

ed as the first Municipal Inspector in the province and has been with the Department ever since.

Mr. W. M. Fleming, B.S.A., 1919 graduate of the University of Alberta, formerly of London, Ontario has succeeded Mr. S. H. Hopkins as agricultural, representative and instructor in the high school at Duncan, B.C. Since his graduation Mr. Fleming has been working in the Field Husbandry Department of the University at Edmonton.

The Live Stock Branch of the Saskatchewan Department of Agriculture offered two carloads of choice young grade ewes all bred to registered pure bred rams at the Prince Albert stock yards between Jan. 20 and February 1. This gave the farmers of northern Saskatchewan an opportunity of purchasing very good stock at moderate prices and on easy terms.

A recent Order in Council provides for a change in the method of leasing land in the prairie provinces, and the order governing grazing permits on school lands in those provinces is rescinded. All permits shall be on a yearly basis terminating April 1, at a rental of ten cents per acre per annum, subject to change at the discretion of the Minister of the Interior.

The courts of the United States regard violations of the Migratory Bird Treaty Act with increased concern. A recent Connecticut violator of this act was sentenced to three months in jail while another in Michigan for selling thirty-two wild ducks was fined five hundred dollars. The above Act is designed to protect migratory birds, insectivorous birds and non-game birds.

Two men were recently arrested in Missouri for hunting and killing wild geese from an aircraft. Hunting of this sort is specifically forbidden by the federal law and the regulations thereunder and several states have passed laws forbidding hunting from airplanes. The arrest was made by a warden of the Biological Survey, United States Department of Agriculture which administers the Migratory Bird Treaty Act.

The Dominion Shorthorn Association in co-operation with the Shorthorn clubs of Manitoba and Saskatchewan is putting on the following Shorthorn sales: Yorkton, Sask., February 26, Dauphin, Man., March 31, and Swan River, April 1. The cattle will be selected with the view to introducing stock that will make their influence felt in the more economical production of milk and beef for the farmers of this district.

The need of a hot school lunch for school children has been realized in fifty-five schools in twenty-nine counties of the state of Missouri. Lunch clubs have been organized

under the supervision of the boys' and girls' club department of the extension service of the college of agriculture, University of Missouri, and it is expected that the experience of the clubs this winter will serve to promote the installation of more of them in the schools next season.

The supervisor of live stock yards in the Live Stock Branch of the federal Department

of Agriculture has advised the various live stock exchanges in Canada that on and after April 1st, 1920, the exchanges must discontinue charging for packers' insurance, which has amounted to about one-half of one per cent of the gross sale, or in some cases, a set sum per head. This order is issued by virtue of the Live Stock and Live Stock Products Act which gives the Minister of Agriculture the control of stock yards.

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PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty,
International Institute Commissioner, Department of Agriculture, West Block, Ottawa.

SCIENCE AND PRACTICE OF AGRICULTURE

GENERAL INFORMATION

Importation of Potatoes into Australia.—
Commonwealth of Australia Gazette, September 18, 1919

The following particulars, taken from the *Commonwealth of Australia Gazette* of 18th September, 1919, of the restrictions on the importation of potatoes into the Commonwealth are published for general information:—

The Proclamation published in the *Commonwealth of Australia Gazette* of 18th October, 1917, is repealed, and it is now proclaimed that the importation of potatoes into any part of Australia from any country is prohibited unless—

- (1) They are accompanied by an official certificate, dated and signed by a responsible officer of a Government Department, of the country of origin, identifying the potatoes, specifying the quantity, and certifying—(a) That at the date of the issue of the certificate they were free from *Phytophthora infestans* (known as Irish blight), *Synchytrium endobioticum* (known as potato-canker, black scab, warty disease, and cauliflower disease in potatoes), *Spongiospora subterranea* (known as powdery scab), and all other serious diseases; (b) that they were grown in the country named; (c) that they were grown on premises known after due investigation not to be or to have been during the preceding twelve months infected with any of the said diseases; (d) that they were packed in the country of origin in clean, new packages.
- (2) The bags, crates, or other packages containing the potatoes are marked on the outside with the name of the country of origin and with other distinguishing mark or marks.
- (3) The potatoes, after being landed, are planted in a quarantine station, and after having matured are, with the

product of their cultivation, found on inspection to be free from disease.

Provided that no consignment of potatoes shall exceed 14 pounds in weight, unless the potatoes are imported by or on behalf of a State Government.

Provided further that the Minister may permit potatoes which are certified by a Quarantine Officer to be free from disease to be imported under and subject to such conditions as the Minister may think fit to impose, for use as food.

CROPS AND CULTIVATION

The Value of Sodium When Potassium is Insufficient.—HARTWELL B. L., and DAMON, S. C., in *Rhode Island Agricultural Experiment Station Bulletin* 177, pp. 4-32. Kingston, R.I., 1919.

This bulletin reports the crop results for the period of 1905-1918, inclusive, of a series of field experiments begun in 1894 to ascertain the value of sodium as an entire or partial substitute for potassium. Sodium and potassium were applied in various amounts, both as carbonates and chlorides and in connection with different amounts of lime. Nitrogen and phosphorus were applied equally to all plats, usually in such amounts as to render potassium the only deficient element. The crop data are presented in tabular form, and include information on the effect of the different treatments upon flat turnips, radishes, rutabagas, table beets, cucumbers, buckwheat, cabbage, sugar beets, mangels, oats, hay, onions, carrots, rape and potatoes. The results secured may be summarized as follows:—

When an insufficiency of potassium occurred, sodium was generally useful, confirming earlier work with water cultures of cereal seedlings, which likewise showed that when potassium was deficient sodium became beneficial. It was commonly observed that if in the absence of sodium a depression of 30 per cent in the growth of the seedlings was

caused by partially withholding potassium, the growth was not depressed more than half as much in a similar culture to which sodium was added, indicating a direct beneficial action of sodium, for under the conditions of the experiment it could not liberate potassium. In the field, however, more potassium was removed in the larger crops which usually resulted when sodium was increased in connection with an insufficient amount of potassium, in spite of the fact that sodium frequently decreased the percentage of potassium in the crop. A portion of the benefits arising from the use of sodium in the field is, therefore, believed to be due to indirect action, although the culture solutions indicate that direct beneficial effects were also probably obtained in the field. The yield in grains due to sodium are deemed sufficient to merit careful consideration at the present time of the utilization of our liberal supply of sodium salts as economic supplements to a limited amount of potassium.

The Phosphate Industry.—HENDRICK, J., in *Journal of the Society of Chemical Industry*, Vol. 38, No. 9, pp. 155-157. London, 1919.

The author discusses the phosphate industry throughout the world, with special reference to the United States and Great Britain, and reports the average results of 66 field experiments with turnips covering four years at the North of Scotland Agricultural College comparing soluble and insoluble phosphates.

The general result of the experiments is to show (1) that the average effect of superphosphate is only slightly greater than that of insoluble phosphate, such as basic slag or ground mineral phosphate, when equal weights of phosphoric acid are applied, and (2) that if one-third of the phosphoric acid is given as soluble phosphate and the remainder as insoluble phosphate the average result is as good as when the whole of the phosphoric acid is given as soluble phosphate. Experiments with other crops and especially with grass give a similar result. The only conclusion is that soluble phosphate is overvalued, and insoluble phosphate, such as exists in basic slag and ground mineral phosphate, undervalued. It should be possible in future to use a large part of the rock phosphate in the form of finely ground powder instead of in superphosphate. This will effect a great saving in acid and in expense.

834.—The Present Status of Nitrogen Fixation.—WHITE, LT., COLONEL, A. H., in *The Journal of Industrial and Engineering Chemistry*, Vol. XI, No. 3, pp. 231-237. Easton, Pa., March, 1919.

Fixed nitrogen in some form is an essential constituent of the food of all the higher animal and vegetable organisms. Fixed nitrogen in the form of potassium and sodium nitrates has been of prime importance

in warfare since gunpowder came into general use. The ammonia resulting from the destructive distillation of coal has been recovered and used in the chemical industry for more than a century. Free nitrogen forms nearly eighty per cent of the air we breathe, but in the free form it can be utilized neither by the bodily mechanism nor in explosives or fertilizers. The chemist has known for many years how to convert this inert gas into other compounds in his laboratory, but it is only within the last twenty years that the fixation of nitrogen has been recognized as an industrial as well as a scientific problem, and only within the last five years that its importance has become generally recognized.

Sir William Crookes, in 1898, called attention to the diminishing supply of Chilean nitrate, and the need of replacing it with a synthetic product if the world was not to be confronted with possible starvation as a result of shortage of nitrogen fertilizers.

It is the first step in nitrogen fixation which is the most difficult. The nitrogen molecule as it exists in the air is very inert and becomes active only at high temperatures or in the presence of some activating substance. The processes may be classified as follows:

1. *The Arc Process* for the direct combination of the nitrogen and oxygen of the air to form nitric oxide which subsequently by oxidation with air and combination with water forms nitric acid of approximately 35 per cent concentration. There are required about 10.5 h.p.-years electrical energy per ton of nitrogen fixed as nitric acid per annum.

- II.—*The Cyanamide Process*, involving:

- (1) The production of calcium carbide through reaction between lime and coke in an electric furnace.

- (2) The interaction of calcium carbide and pure nitrogen at a red heat to form calcium cyanamide.

- (3) The decomposition of cyanamide by steam under pressure, to form ammonia.

- (4) The oxidation of ammonia with air and combination with water to form dilute nitric acid of approximately 50 per cent concentration.

The power required by this process is approximately 2.5 h.p.-years per ton of nitrogen converted to nitric acid per annum.

- III. *Nitride Processes.* The best developed of these processes is that for making aluminum nitride from aluminum oxide, coke and nitrogen heated to a temperature of perhaps 1800°C. in an electric furnace. This process has not been developed far enough to show its ultimate power requirements, but it is approximately in the same class as the cyanamide process. The aluminum nitride, after formation, may be decomposed with steam or dilute caustic solutions yielding ammonia and regenerating the alumina.

- IV.—*The Direct Synthetic Ammonia Process*, usually called the Haber process, wherein

pure nitrogen and hydrogen are made to combine in the presence of a catalyst, at temperatures which in commercial work have usually approximated 500° to 600°C. and under a pressure of 100 atmospheres or higher. The ammonia made by this process is then oxidized with air and converted to nitric acid. Electrical energy is not necessary for this process and the total power requirements are only about 0.5 h.p.-year per ton of nitrogen fixed as nitric acid per annum.

V. *The Cyanide Process*, wherein a mixture of sodium carbonate and coke with iron in small quantities is heated in a stream of pure nitrogen to a temperature of approximately 1000°C., resulting in the formation of sodium cyanide. This furnace product may be decomposed with steam, yielding ammonia. Power requirements for this process are of the same order as for the Haber process.

It will be seen that all of the above processes, except the arc process, yield ammonia as their initial product. The arc process requires the greatest expenditure of electrical power, the cyanamide and nitride processes rank next, and the direct synthetic ammonia and the cyanide processes require only small

amounts of power. In fact, these two latter processes do not necessarily require any electrical power, it being possible to carry out all the heating reactions without the use of electrical energy, although electrical heating may in some cases be more economical. If nitric acid is desired, the ammonia produced by these processes may be oxidized to nitric oxide by air in the presence of a catalyst, usually platinum, working at 750° to 850°C. The nitric oxide resulting is oxidized by cooling, mixing with more air if necessary, and passing through towers, down which water or dilute nitric acid trickles. The resulting product is about 50 per cent nitric acid. This oxidation process requires very little external energy. It may be considered that the principal problem is to get atmospheric nitrogen into a combined form, and that the problem of converting the initial form of combined nitrogen into the final form is distinctly simpler and better elaborated.

The following table, combined from diagrams in the original article, shows the increase during the war of the world's production of fixed inorganic nitrogen in metric tons 2,204 lbs.)

	1909.	1913.	1917.
1. <i>Chilean nitrate:</i>			
United States.....	46,000	86,000	155,000
Germany.....	101,000	120,000	.....
Allies.....	151,000	176,000	218,000
Other countries.....			9,000
Totals.....	298,000	382,000	382,000
2. <i>Ammonia, by-product coke oven:</i>			
United States.....	21,300	40,000	76,000
United Kingdom.....	75,000	97,000	112,000
France.....	11,800	17,000	23,000
Germany.....	72,000	102,000	150,000
Italy.....			30,000
Russia.....	31,900	87,000	7,000
Other countries.....			63,000
	212,000	343,000	461,000
3. <i>Cyanamide:</i>			
United States.....		12,000	12,000
Germany.....	10,000	12,000	110,000
Italy.....		12,000	10,000
France and Switzerland.....			28,000
Austria.....	10,000		10,000
Sweden and Norway.....			23,000
Other countries.....		19,000	8,000
	20,000	55,000	201,000
4. <i>Arc process:</i>			
Sweden and Norway.....	5,000	16,500	31,000
Other countries.....		3,500	3,000
	5,000	20,000	34,000
5. <i>Haber process.</i>			
Germany.....		8,000	114,000
6. Other processes.....			39,000
GRAND TOTAL.....	535,000	808,000	1,231,000

From the above table it is seen that, apart from the Haber process used only in Germany, the greatest industrial development has been made by the arc process and the cyanamide process.

Experts in the arc process state that a commercial proposition to be attractive must have continuous electrical power in large units at not more than \$12 per h.p.-year.

Others state that the power must be as low as \$8 per h.p. year. It gives as its sole primary product dilute nitric acid, or an alkaline nitrate or nitrite. Until the efficiency of the process is increased it cannot be successfully operated except where large blocks of cheap electrical power are available as in Norway and Sweden.

The cyanamide process has been studied since 1898 and has grown until in 1917 it furnished approximately one-sixth of the world's total fixed nitrogen. It requires large amounts of electrical power, but only one-fourth as much as the arc process. It also requires as raw materials large amounts of pure limestone and coke. It yields calcium carbide as an intermediate and cyanamide as its primary product, with ammonia, nitric acid, or ammonium nitrate as subsequent products obtained by relatively efficient processes.

While many metals yield nitride when heated in nitrogen, the manufacture of aluminum nitride has received most attention because of the possible importance of the alumina obtained as a by-product, for the aluminum industry. It requires large amounts of electrical power and a rather specific raw material, bauxite. The commercial developments of the past have not been successful, and although more is hoped from the two large semi-commercial installations now being tested in the United States, it must still be regarded as a rather unproven process.

The cyanide process does not require electrical power and uses as its raw materials sodium carbonate, coke, iron, and pure nitrogen. Of the raw materials the iron is always recoverable and if the cyanide is converted into ammonia under proper conditions, the sodium carbonate is also recoverable, leaving as the only raw materials actually expended nitrogen and coke in the cyanizing reaction, and steam in the ammonia reaction, together with the coal required to furnish the heat. The initial product is cyanide which may be purified and marketed as such or converted into ammonia with a possibility of sodium formate as a by-product. The development has been largely in the United States and since the war broke out. It has been studied carefully by the United States Government and by several private corporations in plants almost large enough to be called commercial plants. At present the process involves high capital, labour and repair costs. The process must not, however, be condemned in its present immature form.

The direct synthesis of ammonia from nitrogen and hydrogen was first developed both from the theoretical and practical side in Germany, and the name most frequently associated with it is that of Haber.

The reaction between nitrogen and hydrogen is extremely difficult to carry out economically. The successful solution of the problem involves many problems but they may be divided into the following groups: (1) prepa-

ration of pure nitrogen; (2) preparation of pure hydrogen; (3) preparation of catalyst; (4) construction of plant.

It is unfortunate that the term "fixation of nitrogen" fixes attention so strongly on nitrogen that the lay mind gains the impression that one of the chief difficulties to be overcome is the preparation of the nitrogen. The arc process starts with air but all the other processes require, or at least work distinctly better, if supplied with nitrogen substantially dry and free from oxygen, carbon dioxide, and carbon monoxide. Argon, helium and other rare gases of the atmosphere interfere only as they dilute the nitrogen slightly. The supply of pure nitrogen is important, but fortunately the liquid air process furnishes it so cheaply and reliably that the problem may be considered as solved. The nitrogen column as delivered to the United States nitrate plants has an hourly capacity of 20,000 cu.-ft. of dry nitrogen, with less than 0.1 per cent oxygen for an expenditure of 180 h.p.-hours.

Pure hydrogen is needed only for the direct synthetic ammonia process. It forms 17.6 per cent of the theoretical gas mixture by weight, but 75 per cent by volume. Hydrogen is formed as a by-product in the electrolytic manufacture of chlorine, but the expense of collecting it and purifying it is considerable. Hydrogen and oxygen are obtained by electrolysis of caustic solutions, but it is difficult to find a location where both gases can be used to advantage. It is also made by the action of steam on red-hot iron and by the water-gas reaction wherein steam reacting with coke produces approximately equal volumes of carbon monoxide and hydrogen. By further reaction with steam in the presence of a catalyst, most of the carbon monoxide may be removed with the formation of an equal volume of hydrogen, but a long and elaborate purification process must be followed to bring the gas to a pure and dry state. The refinement of purity necessary will vary with the different catalysts, but the impurities must certainly be measured only in hundredths of a per cent, if not thousandths. Further research work on the purification of hydrogen is desirable.

Future of Nitrogen Fixation Processes.—The future of the nitrogen fixation industry can be forecasted only in the most general manner. It depends upon two factors, the demand for fixed nitrogen and its price. These two factors are in part independent and in part linked together, for a lowered price is certain to cause a greater demand. The principal demand of the last few years has been for munitions, and the demand was an insistent one which had to be met regardless of price. The great normal demand for fertilizers has been restricted to a minimum. The largest demand for fixed nitrogen in the future will probably be for fertilizers, and the use of fertilizers will be very largely a matter of price. A diagram in the original article shows an increase of roughly fifty per cent in

output for fixed nitrogen for two four-year periods since 1909. It is not probable that 1921 will show such a proportionate increase although if all the resources of Chili and all of the facilities in the way of coke ovens now under construction, and fixation plants should be utilized, the year 1920 might well see a possible production of 25 per cent more than in 1917. What will be the cost of production? The cheapest source of fixed inorganic nitrogen will undoubtedly be the ammonia from by-product coke ovens because it is a by-product and the cost of collecting and putting it into marketable form is small. The coke ovens of the world can now produce more fixed nitrogen than the world used from all sources ten years ago. It will be a powerful factor tending towards low prices. It is probable that Chilean nitrate could, if necessary, be sold at lower prices than in former years. The fixation processes will therefore have to be prepared to meet possible low prices if they are to be ranked as anything more than emergency reliances.

The cost of nitrogen in the staple raw materials sodium nitrate and ammonium sulphate varied from \$12 to \$16 per hundred pounds in the years 1900-1915. It is manifest that a process which is to produce a large proportion of the world's fixed nitrogen must be able to compete with these staple materials. Smaller factories may produce specialized products such as sodium nitrite and anhydrous ammonia for which there is a demand, large in itself, but small in proportion to the world's total demand.

The necessity and the possibility of independence of Chilean nitrate as a material for munitions has been proved in the past four years. The question as to whether the fixation processes can compete with Chilean nitrate and coke oven ammonia in times of peace, and for the cheapest commercial nitrogenous product—fertilizer—cannot yet be answered.

The cyanamide and arc processes both labour under the handicap of the requirement of large amounts of electrical power. The nitride process has a somewhat similar handicap but possesses a possible advantage in the recovery of alumina as a by-product. The cyanide process labours at present under the disadvantage of small manufacturing units but has the advantage of low-power requirements and the possible recovery of formates as by-products. The direct synthetic ammonia process presents great engineering and chemical difficulties, but has great possibilities of future development. If an inventor could find a catalyst active at 300°C. he would have the theoretical possibility of increasing the conversion by one passage through the apparatus at 100 atmospheres pressure to five-fold the conversion at 500°C. Or with such a catalyst, he could work at 30 atmospheres pressure and 300° temperature, eliminating thereby many of the serious engineering difficulties and still obtaining a conversion far better than

anything now commercially known. There is no theoretical reason why such a catalyst might not be made and its discovery would offer the possibility of cheaper fixed nitrogen than anything heretofore known.

The Oxidation of Ammonia.—PARTINGTON, J.R., in the *Journal of the Society of Chemical Industry*, Vol. 37, No. 17, pp. 337R, 338R, London, 1918.

This article deals particularly with the construction and operation of an ammonia oxidation apparatus devised in the course of investigations under the auspices of the Ministry of Munitions of Great Britain, and with the results obtained in the apparatus.

Under established conditions, an output of 1.5 tons of nitric acid (HNO_3) per square foot of catalyst area per 24 hours, with an efficiency of 95 per cent, has regularly been attained. Without the application of external sources of heat, the efficiency, as mentioned, is of the order of 85 per cent. The output of a converter may, however, be reduced to 25 per cent of the maximum rate without affecting the efficiency.

It is stated that while the conversion of ammonia to oxides of nitrogen is a matter of no great difficulty once the conditions are understood, the utilization of oxides of nitrogen produced is an intricate problem to which a considerable amount of research has been devoted, particularly the question of the use of the oxides in sulphuric acid manufacture. The ammonia oxidation process has already been adopted by several of the large sulphuric works in England, and undoubtedly has a very extensive future before it in this direction. There is a considerable saving of expense in the replacement of nitre by ammonia oxidation, in addition to the much more regular working of the process. The conversion of the oxides into nitric acid and many other ways of utilizing them are also being investigated.

Effect of Alfalfa on the Fertility Elements of the Soil in Comparison with Grain Crops. SWANSON, C. O., and LATSHAW, W. L., in *Soil Science*, Vol. VIII, No. 1, pp. 1-39. Baltimore, M.D., July, 1919.

That continuous growing of grain crops decreases the fertility of the soil and that the growing of legumes in a measure restores the fertility are facts well known to students of soil science. To what degree this takes place is not so well known. It is generally assumed that alfalfa helps to maintain the fertility of the soil by securing nitrogen from the air and by preventing the oxidation of the humus and organic matter which takes place rapidly when cultivated crops are grown; no exact figures seem to have been secured, however. It is very important that such data be available because when the alfalfa crop is removed it is quite possible that the field is left no richer in nitrogen than if no alfalfa had been grown, and because alfalfa

removes a relatively large amount of other plant-food elements.

Kansas produces more alfalfa than any other state, and has some of the oldest alfalfa fields in the country, some of which have been continuously in alfalfa for 30 years or more. This offers unusual opportunities for a study of this kind. The general plan of the experiment was to sample these old alfalfa fields and other fields nearby which were of the same type of soil but had been continuously in cultivation or in native sod. Preference was given to those locations where all these three fields were close enough together for direct comparison. The soil was generally sampled in four depths: 0 to 7 inches, 7 to 20 inches, 20 to 40 inches, and 40 to 80 inches. The samples were analyzed for nitrogen, organic carbon, inorganic carbon, phosphorus and calcium. For purposes of comparisons, the state was divided into three sections: humid, sub-humid and semi-arid. The basis of division was the average annual rainfall. All samples taken from localities where the rainfall is 30 inches or more, were classed as from the humid section, those from localities where the rainfall is between 30 and 22 inches as from the sub-humid section; and those from localities where the rainfall is less than 22 inches as from the semi-arid section.

It was found that in the humid section the surface of the cropped soil had lost one-third of the nitrogen as compared with the surface soil of the native sod. The fields in alfalfa contained 14.3 per cent less nitrogen than the native sod, and 21.6 per cent more than those fields which had been cropped to grain. In the subsurface 7 to 20 inches, the changes due to cropping were much less than in the surface, and in the subsoils there were no changes that could be attributed to the methods of cropping.

In the sub-humid section the fields cropped to grain lost one-fourth of the nitrogen as compared with the surface soil of the native sod. The alfalfa fields contain 5 per cent less nitrogen than the native sod, but 20 per cent more than the fields in grain. In this section the changes due to cropping are also confined to the surface and subsurface. In the semi-arid section the cropped soil has lost one-fifth of the nitrogen as compared with the native sod. Alfalfa fields contained 15.7 per cent more nitrogen than the soils in native sod, and 30 per cent more than the soils continuously cropped. In this section the significant changes are confined to the surface soil. This comparison shows that there is an unmistakable gain in nitrogen of the soils in the semi-arid section. This may be attributed in part at least to the greater loss of leaves in curing alfalfa in the arid section. It may be concluded that the continuous growing of alfalfa may not increase the nitrogen content of the soil. The increased crop production which is usually obtained on alfalfa fields when they

are ploughed up is probably due to the large amount of available nitrogen they contain.

In the humid section, the cropped soils have lost 36 per cent of the organic carbon present in the virgin sod and those in alfalfa over 21 per cent. The fields in alfalfa contain 18 per cent more than those continuously cropped to grain. In all sections the changes in the organic carbon content are confined to the surface soil. There is just one exception to this statement. In the humid section, the subsurface of the native sod has a significantly higher carbon content than the alfalfa or cropped soil. In the sub-humid section the cropped soils have lost 28 per cent of the original carbon content and the alfalfa soils 13 per cent. In the semi-arid section, the cropped soils contain 30 per cent less carbon than the virgin soils and the alfalfa soils 10 per cent less. In this section the changes in carbon content differ fundamentally from the changes in nitrogen which, as previously pointed out, show a gain.

The phosphorus content of the cropped soil is lower than that of the alfalfa soil, or soil in native sod. Alfalfa removes more phosphorus from the soil than grain crops. The fact that the alfalfa fields do not show a lower phosphorus content than the soils in native sod, may be taken to mean that there has been a transference of phosphorus from the subsoil to the surface. This transference has probably taken place because of falling of leaves. Because of the small per cent of phosphorus and the limits of determinations, this conclusion is not so well substantiated as those in regard to nitrogen and carbon. In the humid section, the surface of the cropped soil contains the same amount of phosphorus as the subsoils. In all other cases, the phosphorus content of the surface soil is higher than that of subsoils. This would point to a definite lowering of the phosphorus content of the cropped soil in the humid section.

In the sub-humid and semi-arid sections, most of the soils contain 1 per cent and more of calcium and nearly all have some calcium in the carbonate form. In the humid section, alfalfa was found growing on four soils successfully in which the calcium content was less than 0.5 per cent. The calcium content in most soils varies from 0.50 to 1 per cent, and in the majority the carbonate form of the calcium is absent.

Some Factors in the Winter-killing of Grain Crops.—SALMON, S. C., in *Transactions of the Kansas Academy of Science*, Vol. 28, pp. 129-131. Topeka, Kansas, 1916-17.

It is thought that of the wheat area not harvested (more than 16 per cent of the total wheat area of Kansas) more than one-half (10 per cent of the total wheat area) is winter-killed. A study of the causes of loss from winter-killing has been carried on for about four years and has developed a method of seeding grain in furrows. The plants are protected from wind by the ridges and from

freezing by the snow which fills the furrow. The crop is also injured less by heaving of the soil during freezing and thawing weather (being better rooted in the soil), and is in a better position to absorb moisture. Results of studies on different soils show that winter annuals suffer more on wet soils, except in case of easily injured plants which may be killed by comparatively brief periods of freezing, and that such plants suffer more on sandy soils than on those of the heaviest type except when heaving of the soil occurs.

A Preliminary Study of the Inheritance of Rust Resistance in Oats.—PARKER, J. H., in *Journal of the American Society of Agronomy*, Vol. 12, No. 1, pp. 23-38. Lancaster, Pa., January, 1920.

Pedigree lines of two oat varieties, Burt and Sixty-Day, together with a large number of F_2 generation hybrids between these varieties, were studied in relation to their rust resistance. Most of the inoculations were made on seedlings, but enough were made on plants at time of heading to show that the results were similar.

The rusts used were the crown rust of oats, *Puccinia lolii avenae* McAlpine, and the stem rust of oats, *Puccinia graminis avenae* Erikss. and Henn. Burt and Sixty-Day and all the hybrids of these two varieties so far tested were found to be entirely susceptible to stem rust. All plants of Sixty-Day also were uniformly susceptible to crown rust. Of 223 inoculated plants of Burt, 48 were classified as resistant, 152 as intermediate, and 23 as susceptible. Each of the five hybrid families contained, in the F_2 generation, some plants showing a high degree of resistance to crown rust and others which were as susceptible as plants of the Sixty-Day parent. In other words, there was definite segregation. There was, however, a rather large number of plants which were classified as intermediate and which showed varying degrees of resistance.

The numerical results of inoculations made in the F_2 hybrids were as follows:—

	Number	Per cent.
Seedlings classified as resistant..	81	17.3
Seedlings classified as intermediate.....	61	13.0
Seedlings classified as susceptible	326	69.7
Total.....	468	100.0

The fact that there were so many more susceptible than resistant plants indicates that susceptibility to crown rust in this cross is partially dominant, while resistance is recessive. These contrasted characters are not thought to be due to environmental conditions or to differences in the metabolism of the host plants, but to definite genetic factors. Non-hereditary factors may of course influence or modify their expression.

Rust resistance and susceptibility hardly can be considered as simple characters or as being determined by a single factor difference.

The F_2 generation results, particularly the rather complete series of forms showing varying degrees of resistance and necessarily classified as intermediates, favour the view that several factors are involved, *i.e.*, the multiple factor hypothesis. No attempt has been made to construct a definite factorial hypothesis to explain the results obtained.

This preliminary work has proved the possibility of transferring the character of resistance to crown rust from the Burt variety to plants of the F_2 generation of a Burt and Sixty-Day cross. This suggests further use of the method of hybridization in the effort to produce rust resistant varieties of oats.

586.—Variation and Correlation in Wheat, with Special Reference to Weight of Seed Planted.—ARNY, A. C., and GARBER, R. J., in *Journal of Agricultural Research*, Vol. XIV, No. 9, pp. 359-392. Washington, D.C., August 26, 1918.

During the four years 1914-1917 the authors made a study of variation and correlation in wheat, and arrived at the following conclusions:—

The magnitude of the means for any of the characters studied varied in response to environmental conditions. Lower yields of straw resulted from a reduction in number, total length, or average length of culms per plant, and lower yields of grain from a reduction in the number of kernels. When the kernels developed normally, lower yield was accompanied by a higher average weight per kernel.

In general, a reduction in the magnitude of the means is accompanied by less variability. A number of exceptions to this general tendency occurred.

Correlation between weight of seed sown and resultant plant characters at maturity is not high in any instance and may be so modified by environmental conditions that the relation may be slight or obliterated entirely.

Correlation between plant characters is modified by environment, the degree of modification from this cause varying with the characters considered.

An increased yield of kernels is very closely accompanied by an increase in number of kernels, number of culms, and total length of spikes; and somewhat less closely accompanied by an increase in average weight of kernels per plant, average height of culms, and average length of spikes. A larger number of culms per plant is accompanied by a greater total length of spikes, but not by a greater average length of spikes.

Average weight of kernels is substantially and fairly consistently correlated with yield of kernels, and, subject to radical change due to environment, moderately correlated with average length of spikes. With number of kernels the correlation is rather low but always consistent. Average weight of

kernels is practically independent of average length of spikes.

There is a distinct tendency for greater average height of culms to be accompanied by greater average length of spikes, number of kernels, and higher yield of kernels. Average length of spikes is moderately correlated with average weight of kernels three years out of four. The correlation between average height of culms and number of culms is always low.

There is a distinct tendency for plants of varying height at second leaf to maintain the same relative heights at six weeks, but there is a lesser tendency for this relation to be maintained at maturity.

From this study, conclusive evidence is given that for the conditions under which the work was done, environment reduced radically or obliterated entirely the correlation between weight of seed sown and plant characters among which is yield.

This information answers, in part at least, the questions raised in the introduction to this article regarding the role of weather and soil in comparisons of heavy and light seeds for planting. If these results were applicable to the wheat crop in general during the four-year period, it is clear that on soils of moderately high productivity with favourable weather conditions heavy kernels as compared with light kernels used for planting may be expected to give very moderate or no increase in yield.

In the study of the interrelation of plant characters, a substantial and fairly consistent correlation was found between yield of kernels and average weight of kernels, average height of culms, and a somewhat higher correlation with number of culms. Between average height of culms and average weight of kernels there is a moderately high correlation each year, except in 1915, when the coefficient is very low.

If these relations held for the wheat crop during the four-year period, separating from the crop each year seed of higher average weight would be selecting seed from plants which had a decided tendency towards higher yield, and, with the exception of the year 1915, from plants which were taller and at the same time higher yielding. In 1915, there was practically no relation between average weight of kernels and average height of culms, and separating the larger seeds from this crop would be selecting seeds from both high and low yielding plants.

The tendency of the tallest plants and the plants having the greatest number of culms to be the highest yielders is a valuable index in making individual plant selections from mixed populations.

Pollination of Tomatoes.—BOUQUET, A. G. B., in *Oregon Agricultural Experiment Station Bulletin* 158, pp. 29. Corvallis, Oregon, 1919.

In continuation of previous work an account is given of experiments conducted in

the station greenhouse and in co-operation with commercial growers during the period 1915-19. In obtaining necessary data a total of about 80,000 tomato blossoms have been under observation. The results of other investigators are reviewed and a bibliography is appended.

Hand pollination of flowers has reduced the number of unfruitful blossoms from 66 per cent to 20 per cent of the total number of flowers produced, the percentage of reduction depending upon the comparative thoroughness of the pollination. For various causes difficult to control, when working with a large number of blossoms, a reduction below 20 per cent of unfruitful blossoms seemed to be impossible. The average fruitfulness in typical plants of 15 crops of tomatoes was 72 per cent for pollinated blossoms and 36 per cent for unpollinated blossoms. The average yields for pollinated and unpollinated plants were 7.4 and 4.4 pounds of tomatoes, respectively. The percentage of fruitfulness and unfruitfulness of individual clusters of a crop given specific treatment varied to a considerable extent, but total and average records indicated a remarkable mean of percentage of uniformity of all clusters.

Of various methods of pollination tried, the emasculation method has been more widely used than any other, and is recommended principally because of the ease of applying pollen, prevention of duplication of pollination, and thoroughness of application at a time when the flower is most receptive. Details developed at the station in using the emasculation method are described.

Hand pollination of blossoms stimulated early development of the fruit as compared with naturally pollinated blossoms. Fruits produced from hand-pollinated flowers have been harvested as early as 21 days before fruit from plants not artificially pollinated. The author points out that the cost of pollination for the entire season, which was approximately 3 cents per plant, may be covered by increased yields from pollinated plants in the first two weeks of harvesting, when higher prices prevail. The comparative net returns of plants after deducting the cost of pollination show an increased value of from 16 to 67 cents a plant, or an average of 38 cents a plant for pollination.

It is pointed out that whereas regularity and thoroughness of pollination are conducive to high plant yield, inexperienced labour, haste, and irregularity in doing work may not produce profitable net results.

Relation of Varying Degrees of Heat to the Viability of Seeds.—BURGESS, J. L., in *Journal of the American Society of Agronomy*, Vol. XI, No. 3, pp. 118-120. Lancaster, Pa., 1919.

Corn, wheat, oats, rye, cowpeas, soy beans, and garden beans were subjected to varying degrees of dry heat for different lengths of time in tests conducted at the

North Carolina Department of Agriculture seed laboratory in an effort to ascertain the effect of high temperatures employed in the control of insect pests on the viability of the seed.

While the results as a whole are deemed rather unsatisfactory, the minimum temperature used, 140°F., as well as much higher temperatures in certain instances, failed to show any harmful effect on the viability of garden beans, soy beans, oats, and rye. Corn and wheat were seriously injured at temperatures above 150°, while data are lacking as to the effect of lower temperatures. Cowpeas appeared to withstand fairly well heating to 140° for one hour.

Losses of Organic Matter in Making Brown and Black Alfalfa.—SWANSON, C. O., CALL, L. E., and SALMON, S. C., in *Journal of Agricultural Research*, Vol. XVIII, No. 6, pp. 299-304. Washington, D.C., December 15, 1919.

Large losses of alfalfa due to improper curing of the first crop have led to the employment of methods other than that of curing in the field and stacking. Some farmers convert the green alfalfa into silage, but there are so many difficulties in making good silage from alfalfa that this method is rarely practised. Others stack the alfalfa in a partially wilted condition. The great weight excludes the air, and fermentations occur somewhat similar to those which occur in a silo. The product is known as brown and black alfalfa. The degree of colour depends upon the conditions which control the nature and extent of the fermentations. Some of these conditions are moisture content of the alfalfa when stacked, size and shape of stack, and temperature and rainfall during the time of curing. Such alfalfa, according to growers who use this method, is relished by cattle; and some practical feeders consider it superior to ordinary alfalfa hay.

However, when fermentation occurs there is evidently a loss in nutritive value. Since the nature and amount of these losses apparently were unknown, the writers decided to investigate them and also to compare the feeding value of black and brown alfalfa with that cured in the usual way.

The details of the experiment are given in the article, and the results tabulated. The authors arrived at the following conclusions:

Partially wilted alfalfa stacked without curing undergoes changes which result in the loss of about two-fifths of the organic matter.

This loss apparently increases with the length of time in the stack and with the degree of fermentative changes that occur.

Alfalfa which has become black as a result of fermentation is very inferior as a feed for steers in comparison with both brown alfalfa hay and alfalfa hay of good colour and quality.

Some Factors Favouring or Opposing Fruitfulness in Apples.—WIGGANS, C. C., in *Missouri Agricultural Experiment Station Research Bulletin* 32. Columbia, Missouri, 1918.

The results of a number of experiments dealing with fruitfulness in apples are reported. These include performance records of fruit spurs; sap concentration studies, both by the freezing method and by actual chemical analyses; fertilizer experiments, and experiments in girdling, tillage, pruning, and etherization. A review of the literature bearing upon the favouring or opposing fruitfulness in apples is included.

Various performance records in individual fruit spurs on trees of different varieties of apples were started in 1913 and continued for a five-year period in order to determine whether an individual spur or branch blossoms two or more years in succession, in alternate years, or only once in its life history as a fruit bearer. The data from these records are here tabulated in summarized form and discussed.

Jonathan, Grimes, and Winesap were able to develop a fairly high percentage of blossoms each year while Rome, York, and Gano produced an exceedingly high percentage of blossoms one season and a very low one the next. The varieties used show remarkable uniformity with respect to the percentage of the individual fruit spurs which alternate, that is, bloom only once in two years. Jonathan and Winesap were able to develop blossoms in successive seasons on the same spur in a much greater proportion than the other varieties observed.

The work indicates that the soil in which the tree is growing has little effect upon the performance of the individual spurs with respect to alternation. Contrary to the results of some investigators, however, it appears that the fruitful year of certain alternating sorts may be changed by the removal of the blossoms through either accident or design. The age of the spur systems of the various varieties is practically the same, ranging usually from 2 to 8 years, 3 to 6 or 7 years being apparently the most effective fruiting age.

In order to determine whether there is a correlation between the concentration of plant sap and stored reserves in bearing and nonbearing parts and the observed bearing or nonbearing condition, determinations were made by the freezing point method and also by making an actual chemical analysis of the parts under consideration. Results as here presented indicate that sap from bearing spurs has a slightly higher concentration (lower freezing point) during a considerable portion of the year than sap from nonbearing spurs. A marked decrease in the sap concentration of both bearing and nonbearing spurs occurs in late June or early July. Leaf sap from bearing and nonbearing

spurs shows considerable variation in concentration. The number of fruits on a spur affects the concentration of neither spur nor leaf sap. Sugar and starch were found to be present in slightly greater amounts in the bearing spur than in the nonbearing one.

Counts and measurements were made of the leaves on fruit spurs during three seasons. They indicate that bearing spurs have a smaller total leaf area than nonbearing spurs, the difference being due to the number of leaves developed rather than to the size of the individual leaves.

To determine the effects of girdling upon the concentration of plant sap a number of nursery trees ranging from 3 to 5 years old were girdled in the two seasons 1915 and 1916. Girdling, regardless of the season, caused an increased concentration of sap in the parts above the girdle and a decreased concentration in the parts below. The most marked effects are in the parts nearest the girdle, the effect being lessened as the distance from the girdle increased.

Fertilizer experiments were conducted with dwarf Rome apple trees planted in boxes of sand or soil. Nitrogen, potash, and phosphorus were used both alone and in combination. The results showed that effects upon the size of the tree, the development of its fruiting wood, and the production of blossoms could be attributed only to the use of nitrogen, which was a very decisive factor in both the formation of fruiting parts and the development of blossom buds.

Tillage experiments have been conducted at the station for a number of years. Some data are given showing the effect of the tillage method upon depression of twig sap in several varieties. The results, as a whole, show that trees growing in a permanent sod of either grass or a legume had a higher concentration of twig sap than trees growing in plats planted with either annual or biennial cultivated crops.

A pruning experiment was begun in 1914 with 1-year-old Delicious apple trees to determine the relative influence of different pruning systems upon the size, character of growth, and fruiting age of apple trees. The results thus far secured show that trees headed at 5 or 6 feet did not produce so many short branches (potential fruiting wood) during the first three years in the orchard, as trees headed at 2 feet.

In view of the fact that etherization has proved to be a very effective stimulant upon the enzym activity of detached parts of woody tissues, 12 Jonathan apple trees were etherized, one each month, beginning December 1914, and continuing until November, 1915. The data given show that etherization has little effect upon the concentration of either twig or leaf sap, and the small differences observed seemed to be only temporary.

FARM ENGINEERING.

An Economic Study of the Gas Tractor in Pennsylvania.—Fox, D. S., in *Pennsylvania Agricultural Experiment Station Bulletin* 158, pp. 3-20, State College, Penn., 1919.

This bulletin reports data derived from detailed records secured from 54 farms in central and southeastern Pennsylvania, on which gas tractors were operated during the year ended in the spring of 1918. Tractors were used chiefly on the larger farms, 123 acres of crops per farm being the average. The average purchase price was \$959, and the average estimated life of the tractor was 8.1 years. Kerosene at 12 cents per gallon was a cheaper fuel than gasoline at 25 cents. The cost per 10-hour day was \$2.06 for kerosene and \$3.32 for gasoline, and per horse power hour 2.2 and 3.1 cents respectively.

The average tractor did 50.6 days' work. There was an average of 12.8 days of ploughing, 9.3 days of harrowing, and 19.6 days of belt work. The average tractor used a little over 1 gallon of cylinder oil worth 45 cents for each 10-hour day. The average cost of operation including operator's labour was \$622.12 for 50.6 days, or an average of \$12.30 per day. The cost excluding the operator's labour was \$495.62, or \$9.80 per day. The size of farm was increased in only two cases, and more intensive crops were grown on only 7 farms of the 52 that were operated before the purchase of the tractor.

The most important factor affecting the cost of operation was days of work done per tractor. Tractors working 30 days or less, or an average of 24.3 days, cost \$19.97 per day, while tractors working over 70 days, or an average of 84.9 days, cost only \$9.85 per day. In the second case the overhead cost was distributed over more days of work.

The average tractor cost of ploughing was \$2.33 per acre. The plough cost was 71 cents per acre, making a total of \$3.04. The tractor cost for harrowing and disking was 69 cents per acre for once over the ground, and excluding the cost of tillage implements used.

The farmer's son was the most efficient operator. The average cost per day was as follows: Son \$10.75, owner \$12.16, and hired man \$12.82. An average of 1.8 horses were disposed of on 48 farms. The cost of operation, less the operating labour, was \$275.34 for each horse replaced.

There was a change in layout on only two farms. The fields on most farms, however, should be rearranged for efficient tractor operation.

AGRICULTURAL INDUSTRIES

Potash from Kelp: The Experimental Plant of the United States Department of Agriculture.—TURRENTINE, J. W., and SHOAF, P. S., in *Journal of Industrial and Engineering Chemistry*, Vol. II, No. 9, pp. 864-874. Easton, Pa., 1919.

A detailed description is given of the experimental kelp-potash plant of the United States Department of Agriculture at Summerland, Cal., which, designed for the determination of the best methods of processing kelp for the extraction of potash salts and the simultaneous recovery of other valuable products, was erected during the summer of 1917, and put into operation in the early fall of that year.

One hundred tons of raw kelp per day are subjected to a process involving drying, destructive distillation, lixiviation, evaporation, and fractional crystallization for the preparation of high-grade potassium chloride.

The by-products, kelp oils, creosote, pitch, ammonia, bleaching carbons, salt, and iodine, are yielded in commercial quantities by this process. The main problem now in hand is their commercialization. It is confidently believed that they will be made to yield sufficient revenue to enable the main product, potash salts, to be marketed successfully in competition with potash from foreign sources.

Complete operating cost data are being tabulated covering the various details of manufacture. These, together with full specifications and designs, will be made available for the use of the interested public. The results obtained to date indicate that it will be possible to establish on kelp as the basic raw material a new American chemical industry of considerable size and of importance and usefulness to the nation.

Charts are included illustrating the general operations and products of the plant, the products of the dry distillation process, and the organization and personnel of the staff.

987.—Hydration Capacity of Gluten From "Strong" and "Weak" Flours.—GORTNER, R. A., and DOHERTY, E. H., in *Journal of Agricultural Research*, Vol. XIII, No. 8, pp. 389-418. Washington, D.C., May 20, 1918.

It is a well-known economic fact that there is a great variation in the baking quality of flours prepared from different wheats. The hard spring wheats, especially those of the northern portion of the Great Plains area produce a flour which has superior baking qualities, while the softer wheats produce flour of inferior baking qualities. In order to differentiate between these qualities of the flour, the terms 'strong' and 'weak' flour have been generally accepted. According to the definition adopted by a committee of the National Association of British and Irish Millers: 'a strong wheat is one which yields flour capable of making large, well-piled loaves; the latter qualification thus excludes

those wheats producing large loaves which do not rise satisfactorily'. W. Jago in 'The Technology of Bread Making,' London, 1911, similarly defines 'strength' as 'the measure of the capacity of the flour for producing a bold, large-volumed, well-risen loaf.'

The authors give an historical review of studies on the subject, then describe their own experiments with glutes derived from flours of widely differing baking strength in order to determine what correlation, if any, exists between the baking qualities of the flour and the hydration capacity of the gluten. They present data showing the increase or decrease of water imbibition by immersing weighed disks of gluten from five selected flours in solutions of lactic, acetic, boric, phosphoric, hydrochloric, and oxalic acids of various concentrations, both with and without the addition of 0.005 molar concentrations of certain salts.

Data have also been presented showing different flour analyses such as ash on dry flour, soluble ash, specific conductivity of flour extract, percentage of moist gluten, percentage of dry gluten, percentage of ash in dry gluten, and baking tests.

From a study of these data, the following conclusions have been drawn:—

Although the moist glutes from these flours differ widely in 'quality' and in physical properties, they are hydrated to almost exactly the same extent. Gluten from a weak flour has a much lower rate of hydration than gluten from a strong flour. Gluten from a weak flour has a much lower maximum hydration capacity than gluten from a strong flour, changing from a gel to a sol at a much lower degree of hydration.

Two types of imbibition curves were observed. Dilute solutions of hydrochloric acid and of oxalic acid cause the gluten to rapidly imbibe water, while at slightly stronger concentrations of acid water is actually extracted from the moist gluten. Dilute solutions of lactic, acetic and phosphoric acids cause the gluten to strongly imbibe water, but stronger acid solutions only slightly diminish the imbibition. The hydrogen-ion concentration of the acid is not the only factor influencing imbibition, but it is pointed out that the anion and the undissociated molecules, as well as their relative absorption by the protein, must in all probability be taken into consideration.

Inorganic salts when added to an acid solution lower the relative imbibition of gluten placed in such solutions. Glutes from the different flours react differently to the addition of inorganic salts. The acid and salt contents of the flours are not responsible for the difference between a strong and weak gluten.

The postulation that the different physical conditions observed in glutes derived from different flours are due solely to the presence or absence of an electric double layer around the colloidal particles is not consistent with

the facts recorded in this paper. A strong gluten would differ from a weak gluten even at the isoelectric point.

There is an inherent difference in the gluteins from the strong and weak flours. The physico-chemical properties of the gluteins from the different flours are not identical and would not be identical even if the flours had originally had the same acid and salt content.

The difference between a strong and weak gluten is apparently that between a nearly perfect colloidal gel with highly pronounced physico-chemical properties, such as pertain to emulsoids, and that of a colloidal gel in which these properties are much less marked. It is suggested that such differences may be due to the size of the gluten particles and that at least a part of the particles comprising the weak gluten may lie nearer the boundary between the colloidal and crystalloidal states of matter than is the case with the stronger gluteins.

Flour Mills in Russia and Siberia.—*The Millers' Gazette*, Vol. V, No. 47, p. 7, London, November 19, 1919.

There were about 2,500 large and 5,000 medium-sized mills in European Russia three years ago, grinding more than 12,000 bushels annually. Wheat flour constitutes three-fourths of their production, and rye about one-fourth. Large mills are steam-driven; medium-sized mills frequently have oil engines. There are several hundred thousand wind and water driven mills among the peasants. The total production before the war was about 225,000,000 rubles (\$116,000,000 with exchange at par) annually, and the number of workers employed probably about 200,000. The Volga region and the South each produce about one-fifth of the total. The largest mills are located in Nizhni Novgorod, grinding over 12,000 bushels daily. In the Tomsk Government of Siberia flour milling constitutes 60 per cent of the total industry. Novonikolaevsk is the centre, producing 6,600,000 bushels annually; Tomsk produces 2,400,000 bushels, Barnaul 1,500,000 bushels, and Biisk and Kamenka 600,000 bushels each. In the Tobolsk Government flour milling constitutes 55 per cent of all industry. The centres and their annual production are: Tyumen 1,800,000 bushels; Kurgan, Omsk and Semipalatinsk, together 6,000,000 bushels. In the Irkutsk Government there are 26 large mills. In the Priamur region, Blagovyeshtchensk is the centre producing 3,000,000 bushels. In the Maritime Province and the South Ussuri region there are 85 steam mills, 65 water-driven mills, and 215 windmills. Some of the Siberian mills are of the latest type.

PLANT DISEASES.

Apple Scald.—BROOKS, C., COOLEY, J. S., and FISHER, D. F., in *Journal of Agricultural Research* Vol. 16, No. 8, pp. 195-217. Washington, D.C., February, 24 1919.

In continuation of studies on the effect of various factors on apple rot fungi and the scald of apples in storage, the authors give a report of additional work conducted in the Bureau of Plant Industry, U.S. Department of Agriculture, on the nature and control of apple scald.

Apple scald is claimed to be due to volatile or gaseous substances that are produced in the metabolism of the apple and can be taken up by various absorbents. Well matured apples are less subject to scald than immature ones, and apples from heavily irrigated trees scald worse than those from trees receiving moderate irrigation. In storage the development of apple scald was found to increase with a rise in temperature up to 15 or 20°C., but the trouble has not been observed to occur at 25 or 30°. The effects of water vapour, carbon dioxide, and oxygen on the development of scald were investigated, and it was found that scald was considerably reduced by decreasing the humidity, although the beneficial effects were not entirely due to the decreased moisture in the air. Accumulations of carbon dioxide did not favour the development of apple scald, rather tending to prevent it, and apples susceptible to scald were made immune by storing them for a few days in an atmosphere of pure carbon dioxide. The effect of ventilation on scald in storage is reported upon, it having been found that thorough aeration aids materially in reducing the amount of injury due to this cause.

INJURIOUS INSECTS.

Late Dormant vs. Delayed Dormant or Green Tip Treatment for the Control of Apple Aphids.—REGAN, W. S., in *Massachusetts Agricultural Experiment Station, Bulletin* No. 184, pp. 47-57, Amherst, Mass July 1918.

The results obtained in these experiments are summarized by the author as follows: The delayed dormant period is usually indicative of the complete hatching of apple aphid eggs. At this time the buds have expanded from a quarter to half an inch. Lime-sulphur solution at full dormant-season strength is less than 10 per cent effective against the living Aphids when applied at the delayed dormant period. Lime-sulphur applied at the late dormant period, before the buds split open and just before the hatching of the eggs, appears to be highly effective under favourable conditions in destroying the eggs, but the elements of thoroughness of application and unfavourable meteorological conditions present such uncertainty as to results that this treatment can

hardly be recommended as an effective control. If lime-sulphur is to be used as a control for San Jose scale (*Aspidiotus perniciosus*) and no special treatment for apple Aphids is to be made later, the best results against Aphids are likely to be obtained by a late dormant-season application just before the eggs hatch. Treatment at this time should also be thoroughly effective against the scale. The application of lime-sulphur (1 to 8) and nicotine sulphur (1 to 800) combination applied at the delayed dormant period gives practically a perfect control for apple Aphids and makes unnecessary a separate earlier application of lime-sulphur for San Jose Scale. The percentage of efficiency will depend mainly upon thoroughness of application. The ordinary dormant-season treatment of apple orchards with miscible oil against San Jose Scale, if applied thoroughly at the delayed dormant period, should result in practically a perfect control of apple Aphids also. Delayed dormant applications of full dormant-season strength lime-sulphur, lime sulphur and nicotine sulphate combined and miscible oils, if perfect, can be made without material injury to apple foliage. Even when the foliage is considerably more advanced, little severe injury usually results. This fact, if taken into account, might make unnecessary separate applications for early and late-budding varieties. As the foliage becomes more advanced, however, the success of the treatment involves greater difficulty, since the Aphids are very hard to reach when they have the spreading leaves for protection. The action of lime sulphur in destroying both the Aphid eggs and living insects appears to be mainly mechanical, by sticking them to the twigs. The action of nicotine sulphate in killing the living Aphids is slow, requiring from about half an hour to twenty four hours or more for different individuals. Death appears to be due to paralysis. Miscible oils are practically instantaneous in their killing action against the living Aphids, the effect being probably of a chemical nature.

The Western Wheat-Head Army-Worm.—

SWENK, M. H., in *State Entomologist Nebraska Bulletin*, 8 pp. 3. Lincoln, Neb., Oct. 1918.

Great damage was caused in 1918 in the United States to spring wheat, Durum wheat and to a lesser extent to oats by the ravages of *Meliana (Neleucania) albilinea limitata* (wheathead army-worm). The injury was first noticed at the beginning of September, but had completely ceased by the end of the month, during which time the damage caused varied from 50 to 70 per cent in some fields, and in one case 300 acres of spring-wheat were completely destroyed. The caterpillars eat the kernels, commencing at the bottom of the head and gradually working their way up, and not infrequently cut the head completely off. As a rule only standing grain is attacked, but wheat in stock is by no means

immune, and in one case caterpillars were even found eating the grain in the bins after it had been threshed.

The moths are on the wing in May and lay their eggs in clusters of 25 to 150 on grasses and grains. The larvae hatch after 3 to 10 days, and become fully grown in about one month. About June or early July they enter the soil for pupation, which takes place in a loose cocoon of earth spun together with silk. The second generation of moths generally appears after about a month, although some individuals may not emerge until the following spring. The moths on the wing during August and early September oviposit between the sheath and stalk of grasses or grain immediately below the upper blades. These eggs give rise to the brood of caterpillars so injurious to cereals in September. When fully grown they drop to the ground and enter the soil as deep as six inches for pupation in which state they hibernate until the following May. The parasites of this pest include several Tachinid flies and Hymenoptera.

The remedial measures advocated are the use of poison baits to be spread across the line of march of the caterpillars, the following formula being recommended: 25 lbs. of wheat-bran, 1 lb. of Paris green, the juice, pulp, and peel of six lemons or oranges ground finely and $\frac{1}{2}$ U.S. gallon of molasses or syrup with sufficient water to make a stiff dough. This bait may also be used in fields already infested, in which case it should be sown broadcast in the late afternoon or night. Care must be taken to keep all stock away from the bait. As most of the injury arises from caterpillars that have migrated from neighbouring grasslands, infestation of fields may be prevented by the use of furrows or ditches in which pits are dug at intervals. To prevent reinfestation in the following year the pupae should be destroyed by deep ploughing; when standing small grain is attacked, it should be cut as soon as possible and immediately threshed or stacked. Infestation in granaries may be dealt with by fumigation with carbon bisulphide.

Weevils in Australian Wheat in California.—

DOANE, R. W., in *Journal of Economic Entomology*, Vol. XII, No. 4, pp. 303-308. Concord, N.H., August, 1919.

Owing to shipping difficulties arising out of war conditions, wheat has had to be stored for an unusual length of time in Australia. No provisions had been made for the accumulation of such large quantities, and ample opportunities were thus afforded for infestation by weevils and other insects. In grain eventually shipped to California the following beetles were found: *Calandra oryzae*, *C. granaria*, *Tribolium confusum* (confused flour beetle), *T. Castaneum (ferrugineum)*, *Silvanus surinamensis* (saw-toothed grain beetle), *Rhizopertha dominica* (lesser grain borer), *Laemophloeus minutus* (flat grain beetle), and *Tenebroides mauritanicus*. The cosmopolitan

parasite of grain weevils, *Mesaporus calandrae*, How., was also very abundant. On arrival at San Francisco some of the sacks had as much as 80 to 90 per cent of their contents injured by weevils. The grain was taken straight from the docks to the mills where it passed through the usual screens to remove the straw, unthreshed heads and other rubbish. Before use it passed through suction cleaners that draw off the light grain, weed seeds, weevils, etc. These screenings, if containing very many beetles, were burned, but if a good deal of grain was retained, were used as feed for pigs, sheep or poultry. All mills handling this infested wheat were urged

to make some provision for the destruction of the insects. Experiments made show that exposure to heat, with a steam pressure of 80 to 150 pounds for twelve hours, killed all the beetles. Various kinds of boxes and rooms were equipped for the purpose, details of which are given. In some cases the wheat was sprayed by means of hand-pumps with carbon tetrachloride at the rate of 2 United States gallons of liquid to 30 tons of the grain. Wheat treated in this way is not injured, and if the bins are tightly closed for at least two or three days, all weevils in them will be found dead.

CONTENTS OF THE INSTITUTE ECONOMIC BULLETIN.

The following is a list of the more important subjects treated in the November-December number of *The International Review of Agricultural Economics*. Persons interested in any of the articles in this list may obtain the original bulletin on application to the Institute Branch, so long as the supply for distribution is not exhausted:—

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Co-operative Sale of Agricultural Products and Purchase of Farmers' Requisites in Canada.....	583-588
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National Mutual Insurance of the Products of Agriculture and Stock-farming in Spain.....	610-614
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AGRICULTURAL STATISTICS

AREAS SOWN TO WINTER CEREALS

A cablegram received from the Institute on February 23, gives the following official

estimates of the areas sown to winter cereals in a number of countries.

Countries.	1919-20.	1918-19.	Five years' average 1913-14 to 1917-18.
	Acres.	Acres.	Acres.
WHEAT—			
Spain.....	9,511,000	10,380,000	10,085,000
France.....	11,369,000	10,980,000	12,700,000
Roumania.....	1,321,000	2,970,000	4,700,000
India.....	27,429,000	23,810,000	31,930,000
RYE—			
France.....	1,959,000	1,810,000	2,170,000
BARLEY—			
Spain.....	4,206,000	4,250,000	3,860,000

FOREIGN CROP CONDITIONS

United Kingdom.—During the first half of January the weather was unseasonably mild and very wet. Towards the end of the month the weather was dryer but still unsettled. The autumn-planted cereals were still well spoken of. Early in February favourable weather prevailed and spring ploughing was progressing under generally satisfactory conditions. Seeding of the new grains had started in some sections.

France.—January was very wet. The winter was decidedly damp and mild, and the chief complaint was a heavy crop of weeds favoured by the mild weather. Early in February fine weather was being experienced and the agricultural outlook was considered somewhat more favourable. The official condition of wheat was estimated to be 68 as compared with 71 last year, and rye 69 against 73. There is a small increase in the acreage to coarse grains, but in general there has been no substitution for wheat in planting. It is not anticipated that the wheat acreage will be much increased by spring sowing as preference will be given to barley and oats. The principal object of consideration among agriculturists is the search for seed and fertilizers.

Belgium.—Winter wheat seeding generally was below the normal, operations being difficult owing to the dampness of the soil. Labour is scarce and dear especially in the neighbourhood of industrial centres.

Sweden.—It is confirmed that the 1919 crops were above the average. During January the new seedlings were in a satisfactory condition, being protected by a good cover of snow.

Norway.—The cereal crops were under-average last year, also hay, but potatoes were well over-average.

Spain.—Crop conditions are very favourable, and the outlook is optimistic. Some wheat is being imported from Argentina.

Italy.—During January crop prospects were satisfactory. Early in February there were some complaints of wetness.

Russia.—No reliable information as to the extent of autumn cultivation or seeding is available.

Poland.—According to Stanislaus J. Arct, representing the Polish Government in food matters at Washington, the present famine conditions in Poland will remain until this year's harvest is in. The yield of grain in the last harvest was 530,000 tons short of requirements.

Roumania.—Official estimates of the areas sown to winter grains in old Roumania are: wheat 1,292,000 acres, rye 100,000 acres, barley 25,000 acres, rapeseed 33,000 acres. In normal times before the war, wheat sowings amounted to 4,693,000 acres, and rapeseed 173,000 acres. This season, there has thus been sown only one-fourth the normal area. It is hoped there will be large sowings of spring grain to make good the deficiency.

Germany.—Reports show that the 1919 harvest as a whole, counting both wheat and rye, was larger than in 1918. The total for the two grains was about 280,000,000 bushels, which is much less than the pre-war production. In the middle of January there were torrential rains in the west and south-west parts of the country. The fields were badly flooded in the principal river valleys, and considerable damage done to crops.

Hungary.—Owing to the Roumanian occupation there is a large shortage in the area sown to winter grains.

North Africa.—Latest reports regarding crops are generally favourable.

Turkey.—Early in February the condition of crops was satisfactory. The acreage to grain is reported to be larger than last year.

India.—The preliminary estimates of wheat acreages indicate a good increase of area over last year. In the middle of January the outlook was satisfactory, although rain was needed in some sections. Early in February the crops were in good condition and recent rains were reported.

Argentina.—A report dated January 15, told of the newly harvested wheat in favourable terms. The quality of the crop is said to be good. During the last weeks of harvest the weather was fine. The condition of the corn crop is reported as very good.

Australia.—Late January estimates placed the wheat crop at 44,000,000 bushels against 80,000,000 last year, and a pre-war average of 90,000,000 bushels. The total available surplus for export on January 1 was estimated at 72,000,000 bushels. A part of the old wheat reserves may be held back until it can be ascertained with fair accuracy what the 1920 crop is likely to be. There were rains late in January and the agricultural outlook had greatly improved.

IMPORTS AND EXPORTS OF WHEAT AND FLOUR

(Flour expressed in equivalent quantities of wheat)
(Thousands of bushels)

Countries.	Imports			Exports		
	November		First eleven months Jan. 1 to Nov. 30.	November		First eleven months Jan. 1. to Nov. 30.
	1918			1918		
	1919	1918	1919	1918	1919	1918
Belgium (1).....	679	.....	3,050	.....	127	706
G. B. and Ireland.....	15,648	16,350	162,713	157,155	108	950
Italy.....	6,278	8,268	88,695	71,393	2	58
Sweden.....	144	87	3,980	1,266	12,137	99,912
Canada.....	65	2	111	146	23,395	251,507
United States.....	410	614	7,829	17,247	13,512	106,808
Argentina.....	.....	.....	.....	.....	195	2,181
India.....	142	.....	7,606	90	.....	.....
Japan.....	982	518	10,791	2,301	7	2
Tunis.....	1	1	9	3	.....	3,363
					75	693

(1) Not including imports and exports for the relief committee.

LIVE STOCK STATISTICS

IRELAND

Classification	Number		Increase(+) or decrease (-)	
	June 1, 1919	June 1, 1918	Number.	Per cent.
Horses.....	624,501	618,807	+ 5,694	+ 0.9
Mules.....	25,582	25,563	+ 19	+ 0.1
Asses.....	222,469	232,159	- 9,690	- 4.2
Cattle.....	5,029,450	4,863,282	+ 166,168	+ 3.4
Sheep.....	3,513,345	3,627,178	- 113,833	- 3.1
Swine.....	977,963	974,385	+ 3,578	+ 0.4
Goats.....	233,287	277,114	- 43,827	- 15.8
Poultry.....		24,424,230		

RED CLOVER SEED SITUATION IN THE UNITED STATES

(The Market Reporter, Feb. 14, 1920).

No kind of seed probably has ever attracted the attention of two continents as has red clover in the past two years. During these two years the available supply has been lower than at any time since red clover has been extensively used in America. A short supply of some kinds of seed would hardly cause a ripple, but a short supply of red clover seed has brought about a veritable tempest because of the great agricultural and economic importance of the red clover crop. Recognizing the present importance of the red clover seed situation, the United States Bureau of Markets has assembled

some of the data relative to red clover seed production, sowing requirements, imports, etc., obtained from the Bureaus of Crop Estimates and Plant Industry and combined them with some of its own data.

The quantity of red clover seed available in the United States at the present time appears to be a little larger than that available at a corresponding time last year, but considerably less than that of two years ago and undoubtedly much less than normal, as indicated by the following figures showing production, seedsmen's carry-over, and imports.

Production, Carry-over, and Imports.

	1919	1918	1917
	Pounds	Pounds	Pounds
Production, including all kinds of clover, but mostly red clover.....	65,940,000	71,820,000	89,280,000
Carry-over on July 1.....	1,838,560	4,177,647	15,533,691
Imports July 1, 1919, 1918, and 1917, to Jan. 31, 1920, 1919 and 1918, respectively.....	9,259,000	127,800	126,900
Total available supply (less exports) on Feb. 1, 1920, 1919 and 1918, respectively.....	77,038,460	76,125,447	104,940,591

Although exports of red clover seed are not taken into consideration in the foregoing table, they probably would not affect the relation between the total supplies of each of the years because the exports of all kinds of clover (mostly alsike, but also including red and white clover,) between July 1, 1919, and December 31, 1919, were only 173,000 pounds larger than between July 1, 1918, and December 31, 1918. This difference probably was more than offset by the estimated larger exports of red clover during January, 1919, than during January, 1920, which latter figures are not available.

On January 1, 1919, and February 1, 1918, the stocks in dealers' hands, less the carry-over from the preceding July 1 and the imports between that date and January 1, 1919, and February 1, 1918, respectively, were approximately 25 per cent of the total production of clover seed for 1918 and 1917, respectively. If this same percentage held true this February 1, it is estimated that the stocks in dealers' hands on February 1, 1920, were about 27,500,000 pounds compared with 23,330,920 pounds on January 1, 1919, and 32,532,410 pounds on February 1, 1918, which figures for the latter dates were obtained from seed surveys.

The larger stocks this February 1 than a year ago are due to the much larger imports since July 1, 1919, than for the same period during the previous year. The imports for the present incomplete fiscal year ending June 30, 1920, are larger than those for any complete fiscal year since 1911, with two exceptions, as may be seen in the following figures:—

Imports for fiscal years ending June 30.	
	Pounds.
1911.....	6,142,981
1912.....	19,674,155
1913.....	5,332,947
1914.....	5,920,934
1915.....	8,932,293
1916.....	32,508,537
1917.....	5,343,600
1918.....	768,300
1919.....	1,050,900
1920 (July, 1919 to Jan. 1920, inclusive).....	9,259,000

EFFECT OF EGG SHORTAGE ON THE SUPPLY OF THE UNITED KINGDOM.

The United Kingdom imported 63 eggs per capita in 1913, but the share of Canada in this trade was infinitesimal. In 1918 but 1.16 eggs per capita came from this country. That the United Kingdom may have to increase importations from America in order to obtain a sufficient quantity to meet her needs is indicated by the following excerpts from an article in the London Morning Post. The writer points out that the production of eggs in the United Kingdom has declined during the war, and this fact, together with the depletion of the stocks of poultry in Continental Europe, the principal source of the egg supply of Great Britain, will cause the seeking of new sources of supply.

"Eggs from other countries in 1913 represented 63 per head of the population in Great Britain, whereas in 1918 only 8 eggs per unit of population were received from overseas a reduction equal to 87 per cent. To indicate the drop, it may be stated that the actual decline of egg imports was 189,235,350 dozen, the weight of which, with cases, would have been upward of 157,000 tons. These figures reveal the fact that, whatever price consumers were willing to pay, there were last year nearly 300 eggs fewer per family than previously used.

"In 1913, of the total egg imports, 2.38 per cent. came from Germany and 4.11 per cent. from Austria-Hungary, the former of which probably owed their origin to southern Russia. These could have been replaced. Now neither of the two countries can have any to spare, even if we are disposed to buy from them. They will require importations to provide for their own needs. In the year named Russia sent direct to Great Britain upward of 95,000 tons of eggs, or 53.07 per cent. of the total British imports; Denmark 35,500 tons, or 19.76 per cent. of the total; and the Netherlands 8,100 tons, or 4.53 per cent. of the total. Thus 83.85 per cent of the aggregate supplies of eggs

It is interesting to know that approximately seven-eighths of the red clover that was permitted entry between July 1, 1919, and November 30, 1919, originated in Italy and one-eighth originated in France. The recent strike in the shipyards of Italy has delayed the arrival of seed brought by American seedsmen, but it is reported that after these belated shipments are received there will not be much more seed available from Italy or France.

This winter there has not been the urgent demand of a year ago for red clover seed from European countries. Fortunately Italy and France have had surpluses of this seed to offer and while undoubtedly the world stocks of red clover are much below normal at this time, they do not appear to be so short as they were a year ago.

were derived from these countries, leaving .16.15 per cent as the proportion of all other lands, of which France was represented by 3.25 per cent. and Italy by 3.92 per cent. of the total

"****Prior to the revolution in Russia, as a result of food shortage and closing of her outlets, the poultry stocks had decreased by 75%. Germany and Austria-Hungary have been almost swept bare, and the same is true of Belgium, which supplied her own needs, but had none to spare. For various reasons, mainly by scarcity and high prices of feed, France has reduced her flocks of poultry by 50 per cent. As her consumption was relatively the highest of all European countries, for a long time to come she can have no surplus for export, even if she has not to import. Italy appears to have suffered least of all in this respect. Before the war, however, her consumption was rapidly overtaking production.

"So far as Denmark and the Netherlands are concerned, the fowls in Denmark now number only one-half as many as they did early in 1914, and in the Netherlands only one-fourth as many. Further, before the war Russian eggs were largely imported into Denmark for consumption there, releasing native supplies to be shipped abroad. Thus more of the last-named are being retained in the country. Had it not been for supplies from Egypt, the United States of America, and Canada, which in this trade prior to 1914 were non-existent or negligible, the shortage of imports into Britain would have been much greater. At the same time the totals from these three countries in 1918 were small, in the aggregate amounting to 13,800 tons. Those from Egypt were equal to 2.19 per head of population in Great Britain, from Canada to 1.16 per head, and from the United States to 1.05 eggs per head, the group representing less than two weeks' normal consumption."

DEPARTMENT OF AGRICULTURE
PUBLICATIONS BRANCH

NOTICE:

Owing to re-organization in the Government Printing Bureau this issue of The Agricultural Gazette has been somewhat delayed. Also, through a mechanical error pages 298 and 299 have been interchanged.

OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920

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DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE

The Agricultural Gazette of Canada

EDITOR: J. B. SPENCER, B.S.A

Issued by direction of
THE HON. S. F. TOLMIE.
Minister of Agriculture

OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920

MAP OF CANADA SHOWING THE LOCATIONS OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

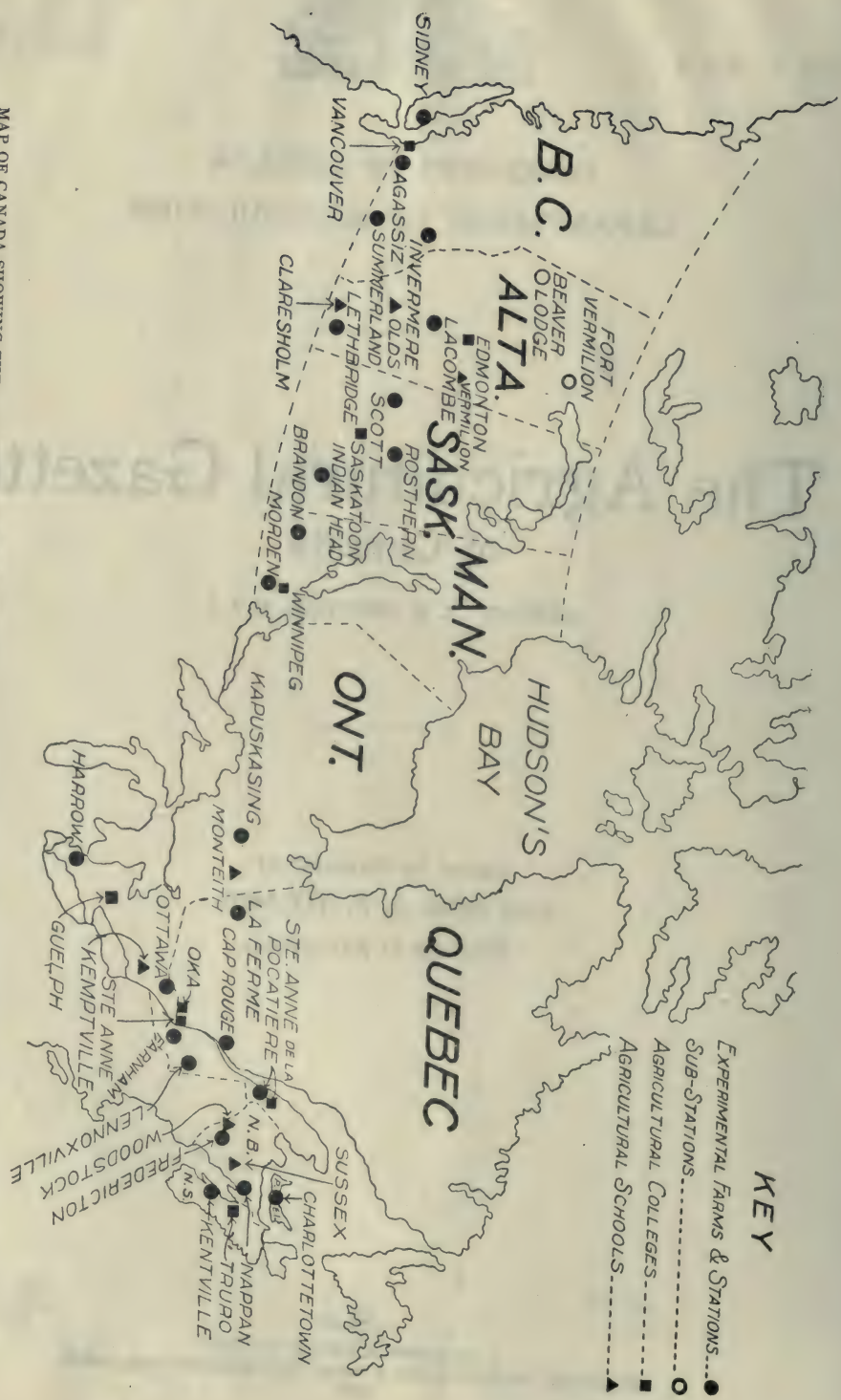


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OF CANADA

VOL. VII

APRIL, 1920

No. 4

THE AGRICULTURAL GAZETTE of Canada is published monthly, in English and in French, by the Dominion Department of Agriculture. It is not intended for general circulation. A limited number of copies, however, are available to subscribers at \$1.00 per annum, or 10 cents per copy.

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INVESTIGATIONS IN THE FLAX INDUSTRY

IN the course of a discussion on the flax industry that occurred in the House of Commons the Honourable Dr. Tolmie, Minister of Agriculture, outlined the investigations that are being carried on by the Experimental Farms in relation to its development in Canada. He said:

"The Government being seized with the importance of the flax industry, established at the Central Experimental Farm a mill for carrying on experiments in the various processes connected with the preparation of flax for market. Ottawa was selected for the purpose because it was felt that the experiments could be kept more closely under the eye of the Department of Agriculture and of the Director of the Experimental Farms. Experiments in retting, breaking, scutching and de-seeding are going on. All this has resulted in securing a great deal of important and valuable information in connection with the industry. Samples are secured from all over the Dominion with the results that a most excellent idea of the quality of the product from the various provinces is being secured. After looking at the industry from all angles we must all be convinced of the great possibilities of the flax growing industry. The principal flax growing districts in Ontario are in the counties of Kent, Middlesex, Huron, Perth and Waterloo. Ottawa is not a first class district for flax growing. In some years it produces an excellent quality of flax, but it is found that if the summers are very dry the plant does not reach perfection. Quebec gives great promise as a flax-producing province. At Chambly-Vercheres flax grows very well, although some of the very best quality is produced at Gaspé. The Maritime Provinces are also producing first class flax. In British Columbia, in the delta land of the Fraser River valley, first class flax can be produced with the aid of irrigation.

Experiments are being carried on by the Government in connection with the various mechanical appliances for dealing with this crop. Pulling machines have been experimented with for several years, and an improved type of this machine is expected to be ready by next year which, it is hoped, will perform this operation without trouble. In all parts of the world this operation has been performed by hand, and consequently in a country such as ours where the cost of labour is very high, it is a serious handicap to the production of flax in competition with those countries where labour is very cheap.

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Experimental work has also been carried on with de-seeding machines. The principal trouble with the ordinary de-seeder has been that it to a certain extent injured the seed, interfering with its germinating properties. This has now been overcome to a considerable extent, and we are producing seed that is received very favourably in the markets of Europe.

Scutchers are also being tested and information received that will be of great benefit to the producers of flax all over the Dominion. Our seed has been able to compete successfully in the markets of the world with the very best seed produced. Before the war about eighty or ninety per cent of the flax used in

Europe was produced by Russia. The state of affairs which exists in Russia would indicate that it will be some time before that country need be regarded as a dangerous competitor in the flax market.

We have a good market in the United States, only small sections of that great country having proved suitable for flax production; we also have a good market at home; and, in addition, we are selling our product in Belgium, France and Ireland. It is particularly creditable that we are able to sell in the markets of Europe, where the highest class of flax is produced and where some of the very finest linens are manufactured.

THE RECLAMATION SERVICE

BY E. F. DRAKE, DIRECTOR

AS ITS name indicates, the *raison d'être* of the "Reclamation Service", a branch of the Department of the Interior, is to facilitate the reclamation of semi-arid, or swampy lands, so as to make them available for settlement and productive cultivation. Its work is chiefly confined to the provinces of Alberta and Saskatchewan and the northerly half of Manitoba where, under the "Irrigation Act," the Dominion Government controls all the sources of surface water supply and prescribes the procedure for the acquiring of rights to the use of water.

The work may be classified roughly in four main divisions: (1) Stream Measurement, (2) Irrigation, (3) Drainage, and (4) Domestic and Industrial Water Supply.

STREAM MEASUREMENT

The Dominion Government has, under the "Irrigation Act" asserted its ownership of the sources of surface water supply as a trust to be administered for the benefit of the public. Obviously the proper administration

of this trust requires a comprehensive knowledge of the nature and extent of the water supply. This knowledge can be obtained only by systematic measurement and observation which, in order to be reasonably accurate, must extend over a period of many years. Systematic stream measurement, technically known as hydrometric surveys, was begun on a small scale in 1909 and has been carried on continuously since, the scope of the work being extended year by year as funds were made available. The work was at first confined chiefly to those districts in which irrigation was then practised, but has since been gradually extended to cover the more important streams throughout these provinces.

The importance of the work of systematic stream measurement has never been fully appreciated by the public. It is the basis of all water administration. It would be just as sensible for a merchant to issue cheques without an accurate knowledge of his bank balance as for the Government to issue licenses to divert and use water without knowing the

quantity of water available for use. The work is exacting and often, especially in winter, subjects the observer to severe hardship. Measuring the flow of an icebound river at a temperature of -45° is far from pleasant. But space will not permit of more extended reference except to say that in its relationship to the other phases of the work of the Reclamation Service, stream measurement is the foundation upon which all the work of water administration

form of crop insurance. For convenience this district is called 'semi-arid.' The cause is the uncertain and often scanty precipitation, which varies from 6 to 34 inches annually, and from 5 to 30 inches during the growing season from 1st May to 30th September, which is insufficient in "lean" years for satisfactory crop production.

The most effective remedy is irrigation, where possible, and it is one of the chief duties of the Reclamation



AN IRRIGATION DAM AND INTAKE CANAL

must rest. The foundation must be sound if the structure is to endure.

IRRIGATION

Canada has no considerable area of 'arid' land, in the sense in which that word is generally used, but there is in southern Alberta and southwestern Saskatchewan a district comprising some 84,000 square miles—or over 50,000,000 acres—in which the climatic conditions make irrigation necessary, or at least desirable as a

Service to determine by careful surveys how the water supply may best be regulated and controlled and applied to the land for irrigation. This involves careful study of each watershed, or drainage basin, the location and survey of reservoirs for the storage of flood water, topographical surveys to determine the location and area of tracts suitable for irrigation, and further surveys to lay out canals to carry the water to the land.

As the land is very largely in private ownership, and as the bene-

fits of increased productivity under irrigation will, primarily, inure to the owners and, secondarily, to the province in the form of increased taxable value, the Dominion government's responsibilities have been held to extend only to the stream measurement and survey work previously mentioned and to such engineering advice and assistance as the locally interested landowners, or the provincial governments, may request when

actual development work is undertaken.

Surveys made in the early nineties—about, or shortly after the time of the enactment of the first irrigation law—have led to the construction of several large irrigation projects now in partial operation, which have resulted in the effective reclamation of large areas of land formerly considered fit only for grazing. These are:—

	Irrigable areas.
C.P.R. Western Section.....	223,000 acres.
C.P.R. Eastern Section.....	410,000 “
C.P.R. Lethbridge Section.....	130,000
Canada Land & Irrigation Company.....	202,000 “



A "DROP" ON A SECONDARY CANAL

Following the completion of the surveys which eventually led to the construction of the works enumerated in the foregoing table, there was a considerable interval of time during which no further large work of this nature was undertaken. This was due, primarily, to a succession of wet years which somewhat dampened the ardour of prospective irrigators, as well as to the fact that further

surveys of this kind were not urgently required, pending the actual completion and operation of the projects then under construction.

Within the last five years, however, a considerable amount of similar work has been undertaken, for the purpose of demonstrating the feasibility of reclaiming other large areas of similarly unproductive land. These surveys comprise:

	Irrigable area.
1. Taber Irrigation District.....	17,000 acres.
2. Lethbridge Northern Irrigation District	97,531 “
3. Lethbridge Southeastern District (approx.).....	300,000 “
4. United Irrigation District.....	20,000 “
5. Lone Rock District.....	8,000 “
6. South MacLeod District.....	50,000 “
7. Retlaw-Lomond District.....	100,000 “
8. Medicine Hat District.....	15,000 “
9. South Cypress Hills District.....	21,500 “

Of these, the Taber District has been organized and it is anticipated that the work of construction will be completed during the present season. The Lethbridge Northern has also been organized as an irrigation district under provincial laws and it is anticipated that the actual construction of works will be undertaken during the present season and possibly completed during the season of 1921.

DRAINAGE

Because of its control of the sources of surface water supply, including lakes, swamps, etc., the Dominion

of surface water supply, including lakes, marshes, etc., is vested in the Dominion government, which also owns the unalienated public land, while control of the drainage of land is vested in the provincial governments. This divided jurisdiction has invited controversy and has seriously interfered with the reclamation of submerged or swamp land and with the construction of roads, and, generally, has exercised a retarding effect upon the settlement and development of the districts comprising any considerable areas of such land.

The present arrangement, which was reached only after several conferences



THE METHOD OF IRRIGATING FIELD CROPS

government has a very practical interest in the work of reclaiming land by drainage, particularly where the operations are on a large scale and involve the complete or partial drainage of lakes, marshes, or other sources of water supply, which have a very important and far-reaching effect upon stream regulation and control.

The problem presented by drainage in the territory within the purview of the Irrigation Act was peculiar: The ownership and control of all sources

and considerable correspondence, is in the nature of a compromise of the apparently conflicting interests. Where drainage districts are organized in accordance with provincial laws the Dominion government will, under certain conditions, transfer to the province at a nominal price any vacant Dominion Lands within such districts in order that such lands, when reclaimed, shall be assessable for their fair share of the cost of their reclamation. On the other hand, the provincial government will, when

the Dominion government desires to take the initiative in the construction of drainage works, place at the disposal of the Dominion all their legislative machinery, upon the condition that the lands when reclaimed shall be sold at public auction, and that the purchasers shall thereafter become responsible for the maintenance of the drains, in the same manner as if the works had been initiated by the settlers themselves under provincial laws.

There is an enormous area of submerged or swampy lands in these provinces that is susceptible of recla-

cate that reclamation is feasible at reasonable cost, and that the land when reclaimed will be suitable for agricultural purposes or grazing, the works will be designed and will thereafter be constructed by contract. No lands so reclaimed will be sold until they have been thoroughly reclaimed, so that prospective purchasers may be assured of a reasonable opportunity of earning a livelihood from them. The drainage of lands in the more thickly settled districts will usually be left to the initiative of the settlers themselves, under the provisions of the provincial



IRRIGATED OATS (FINISHED PRODUCT)

mation by drainage. While the extent of this area is not definitely known, steps are now being taken to inspect and survey a number of very promising projects, and from time to time the scope of the work will be enlarged as the results justify and as funds are made available.

The activities of the Reclamation Service will be confined, chiefly, to those districts in which the bulk of the land is still the property of the Crown. In cases where surveys indi-

laws, the interest of the Dominion government in such projects consisting chiefly of the effect of the draining of lakes or swamps upon the general question of water supply.

While the arrangement herein referred to applies at present only to the provinces of Alberta and Saskatchewan, it may be extended to the province of Manitoba upon the enactment by the government of that province of the necessary legislation. There is a possibility that such action

will be taken by the Manitoba government within a reasonable time.

A tentative arrangement has been reached with the Soldier Settlement Board for investigating the feasibility of reclaiming lands which the Board desires to have made available for settlement by returned soldiers but which, because of their swampy nature, are not suitable for that purpose at present. It is expected that by cordial co-operation between the Reclamation Service and the Soldier Settlement Board, considerable areas of such land may be reclaimed within a reasonable time and thus materially assist in solving the problem of finding enough suitable land for settlement by returned soldiers.

As the result of surveys and investigations made during the season of 1919, several very promising drainage projects have been developed and it is proposed to undertake the actual construction of drainage works in one of these cases; in others, surveys are not yet sufficiently complete to warrant construction but it is anticipated by the end of the present season at least two or three of the more promising projects will be in a sufficiently advanced state to warrant the construction of works, if funds are made available for that purpose.

DOMESTIC AND INDUSTRIAL WATER SUPPLY

As all the sources of water supply within the territory within the purview of the Irrigation Act are under the control of the Dominion Government, rights to the use of such water for domestic, municipal, or industrial

purposes, as well as for irrigation or drainage, can be obtained only by application under the provisions of the law.

Domestic purposes, as defined by law, means household and sanitary purposes and all purposes connected with the watering of stock and the working of agricultural machinery by steam. Industrial purposes means working of railways or factories by steam, while municipal purposes includes household and sanitary purposes and all other purposes usually served by water within a city, town, or village.

Wherever individual settlers, municipalities, or railway companies, desire to divert water from any stream or other source of surface water supply for any of these purposes, it is necessary for them to submit a formal application and plans showing the quantity of water required and the manner in which it is proposed to divert it from the stream to the point of use. If sufficient water is available without interference with other rights, authorization is given for the construction of the necessary works, and in due time, when the works have been satisfactorily completed, a license is issued covering a right to divert and use a specified quantity of water for a specific purpose. As most of the railway and municipal water supplies of the prairie provinces are drawn from sources within the scope of the Irrigation Act, it will readily be seen that the administration of the law involves a considerable amount of investigatory and other work, as several hundred licenses for these purposes have already been issued and many more are pending.

WORK OF THE HOME BRANCH OF THE SOLDIER SETTLEMENT BOARD

BY MISS HELEN G. CAMPBELL, ASSISTANT DIRECTOR OF HOME BRANCH.

THE Soldier Settlement Board of Canada is interested not only in the success of the settler on his farm, but in that of his wife with her work in the home. For this reason, there has been established a Home Branch, the aim of which is better Canadian homes and good Canadian citizenship.

The work of this Branch is under the direction of Mrs. Jean Muldrew and already she and her assistants can point to much good accomplished for the individual and for the community.

To the young wife recently arrived in Canada and to the woman struggling with new or hard conditions, the Home Branch brings cheer, encouragement and sympathetic advice. It is the hand of friendship stretched out to all who need it.

In its big task of reaching every Soldier Settlement Board home in Canada, a thorough organization and large staff of assistants is necessary. Already thirteen assistants are employed and the work is daily expanding.

The work in each district is in charge of a district director and is planned according to the special conditions and needs of that district. Assisting her, is a home counsellor and they, by personal visits, find out the difficulties arising in each home, give advice when sought for, and, in any way possible, assist in making the path to success more assured.

Mrs. A. L. Gordon, provincial director for British Columbia and her assistant, Mrs. I. C. Logie, have already visited nearly 200 homes. They have also done much to arouse and stimulate community interest in matters pertaining to the conservation of health, particularly, in rural districts where the need of nursing and medical care is great.

Through the efforts of the Home Branch in Saskatchewan, three Red Cross "Outposts" or health centres,

are being established. Mrs. Muldrew and Miss Margaret McKillop, the district director for Prince Albert, gathered all data necessary to show the need for such institutions in the more newly settled areas, and, acting in an advisory capacity only, gained the co-operation of Red Cross, Victorian Order of Nurses, and of the people living in these districts. Sites and log buildings will be provided by the settlers; equipment and maintenance for two years by the Red Cross, and qualified, experienced nurses by the Victorian Order.

Miss Sinclair, of the Home Branch in Saskatoon, is also submitting information with a view to the establishment of "Outposts" in other localities where they are much needed to protect and save human life.

In Regina, the activity of the Branch has been largely that of providing free courses of instruction for settlers' wives and dependents. A series of such courses has been planned by Mrs. Cunningham in charge of that district, and three have already been held,—one at Swift Current, one at Moose Jaw, and one at Regina. The enthusiasm and the large enrolment in each place show the desire on the part of the women to take advantage of the opportunity offered.

The courses of instruction are provided by the Extension Department of the University of Saskatchewan and free transportation arranged for by the Red Cross. The local Council of Women have opened their homes to entertain all settlers' wives attending the course and every effort has been made by them and by local organizations to make the week one of happiness and social enjoyment as well as of educational value.

Through Mrs. Cunningham's efforts, and the interest of local business men, and the women's auxiliary to the G. W.V.A., Swift Current and Maple Creek now have pleasant, comfort-

able Rest Rooms which serve as a community centre for farmers' wives who are in town for a day's shopping.

In Edmonton, the work is also planned along lines of human welfare and Miss Storey and Miss Sargent will work in that district.

The work in the Calgary district under the direction of Miss Hotton is now being organized and the foundation is laid by Miss Elizabeth Crawford for splendid co-operative work in Manitoba. An office with Miss Laura Kirby as district director, has recently been opened in Sherbrooke and Miss Williams has this month taken up the work in Toronto.

The first conference of Western Home Branch workers was recently

held in Calgary, where the work accomplished in each district was discussed and plans outlined for the future. Before returning, Mrs. Muldrew will visit the various Soldier Settlement Board offices in the West, stopping in Moose Jaw and Regina long enough to attend the courses being held there. She will carry to them, a personal message of encouragement and inspiration.

From the first, organizations throughout Canada, such as the Red Cross, Canadian Patriotic Fund, Women's Institutes, etc., have given loyal support, and, through, their co-operation, have already made possible much that in the beginning was only a cherished dream of service.

IMPERIAL SOLDIER SETTLERS

A SELECTION committee has been appointed for the purpose of interviewing imperial ex-service men who desire to come to Canada to take up farms under the terms of the Soldier Settlement Act. The members of this committee are W. E. Scott, formerly Deputy Minister of Agriculture for British Columbia, and Russell Wilson of Saskatchewan, a successful pioneer farmer of the Great West. Both of these men are experienced in soldier settlement activities having assisted the Board in their respective provinces in an advisory capacity during the past year.

It is the purpose of the Soldier Settlement Board, with the aid of the selection committee, to secure from the British Isles as great a proportion as possible of these immigrants who have agricultural experience; of the others who apply the committee will select according to the suitability

of the candidates for farming in Canada. The candidates selected must possess, on their arrival in Canada, \$1,000 in cash and be prepared to pay on purchased land, live stock and equipment 20 per cent of the purchase price, cash down.

They all come as probationers. Those who have had extended farming experience in the Old Country will be required to work at least one full season on Canadian farms and those without experience at least two years before they can qualify as settlers. The selection committee in the British Isles will consider only those ex-service men who are physically fit and possess such other qualifications as reputation for honesty, intelligence, and thrift. With these prerequisites it is expected that a very desirable class of men will come to Canada during the coming season.

PART I

Dominion Department of Agriculture

EXPERIMENTAL FARMS

DIVISION OF BOTANY

POTATO INSPECTION SERVICE IN 1919

BY PAUL A. MURPHY, IN CHARGE OF POTATO DISEASE INVESTIGATIONS

THE potato inspection carried out in 1919 had, as in 1918, two objects, the certification of crops for seed purposes in Prince Edward Island, Nova Scotia, New Brunswick, Quebec and Northern Ontario, and the examination of the general state mainly as regards diseases of the crop in Southern Ontario, Manitoba, and Saskatchewan with a view to its possible improvement by the introduction of better seed. With the exception of the two western provinces the ground covered was the same as in the previous year. It was intended to extend the survey to Alberta also but shortage of trained help prevented this being done. Including both seed inspection and survey branches, 3,717 fields belonging to 2,462 growers and containing 9,531 acres were visited.

Little further information was secured as to the state of the potato crop in Southern Ontario owing to the season being very unfavourable. The data secured in 1918 revealed an average of 15 per cent of leaf roll and 7 per cent of mosaic and showed the need of new seed over large areas. While these figures are reliable so far as they go, it will probably be found that some of the commercial producing districts in the locality are in better condition. It should be noted that wherever No. 1 grade imported seed (the result of the Division's work of certification), was met, it was doing excellently.

A beginning was made in surveying the western provinces. A consider-

able amount of leaf roll was reported, but probably the worst trouble was the large number of different varieties, 64 different sorts being recorded in the 213 fields visited in Manitoba. This trouble should be reduced considerably in the future by the importation of two cars of No. 1 grade seed which is being made from Northern Ontario.

INSPECTION FOR SEED PURPOSES

It will be seen by reference to table I that 1,605 seed growers asked for and received inspection in 1919, and that the number of fields entered was 2,507, the number of acres which they contained being 6,796. The corresponding figures for 1918 were: growers, 3,492; acres, 10,608. The reduction, which applies only to eastern Canada, was due to the enforcement of a rule whereby application for inspection had to be made either by the grower or his shipper or other representative, thus making the procedure uniform all over the country. The results of this regulation were good, the amount of low grade stock offered for inspection being reduced without lessening the quantity of good seed certified. More time was also available to devote to growers who are really in the business of raising potatoes for seed, and a further curtailment of inspection in the direction indicated would probably make for sound progress.

TABLE I.—*Amount of inspection for seed purposes.*

Province.	No. of growers inspected.	No. of fields inspected.	Acreage inspected.
Prince Edward Island.....	49	67	69½
Nova Scotia.....	104	132	268
New Brunswick.....	999	1,696	5,408
Quebec.....	84	114	453½
Northern Ontario.....	369	498	597

The state of the crop in the different provinces may be gauged from the grading of the fields as shown in table II.

Table II.—*Grading of potatoes in different provinces.*

Province.	No. of fields graded.			Per cent of fields graded.		
	No. 1	No. 2	Discard.	No. 1	No. 2	Discard.
Prince Edward Island.....	50	4	13	74.6	8.0	19.4
Nova Scotia.....	42	62	28	31.8	47.0	21.2
New Brunswick.....	466	300	930	27.5	17.7	54.8
Quebec.....	32	12	70	28.1	10.5	61.4
Northern Ontario.....	311	55	132	62.6	11.1	26.5

These figures call for some comment as it might be concluded that certain of the provinces contained much more poor seed than others. This is not so, to the extent the figures would indicate. Included among the names submitted for inspection in some cases were many growers who made no pretence to produce seed. Where this happened the standing of the province is low, although a considerable amount of good seed may have been found, while in provinces in which the work dealt more with the professional seed grower the showing is more above the provincial average.

Apart from these considerations it is well to direct attention to the large number and high percentage of fields grading No. 1 in Northern Ontario. Sixty-two per cent of all the fields examined in this region passed for No. 1 seed, a figure which is much higher than any other province can show except Prince Edward Island.

Yet the foundation stock used to supply the northern country came originally from eastern Canada (New Brunswick and Prince Edward Island) being specially selected there for the purpose. This clearly indicates the advantage of starting in new districts with the best and most carefully selected seed obtainable. This course of action might be followed with profit in other places.

The superiority of the seed in Northern Ontario, Prince Edward Island and parts of New Brunswick arises mainly from the remarkable freedom from mosaic in Green Mountain potatoes. So far as is known these are the only three places in America where practically clean seed of this variety may be secured in carload lots. The low percentage of mosaic present appears from table III, but in addition to this an Extra No. 1 grade is furnished on request to those who need foundation stock practically free from all disease.

TABLE III.—Average percentage of mosaic in No. 1 Green Mountain seed.

	Per cent mosaic.
Prince Edward Island.....	0.4
New Brunswick.....	4.0
Quebec.....	1.9
Northern Ontario.....	0.9

AMOUNT OF SEED SHIPPED AND PRICES REALIZED

Five carloads of certified seed have been sold in Prince Edward Island at prices averaging more than 70 per cent in excess of market rates. Nova Scotia shipped 15,000 barrels (about 60 cars) of certified seed of the Garnet Chili variety to Bermuda at the satisfactory price of \$2.75 to \$3.00 per barrel. Little seed has been shipped to date from New Brunswick or Quebec as most of the trade is done there is the spring.

Although there was an increase of more than one hundred per cent in the acreage inspected in Northern Ontario the export of seed will not exceed twenty-five cars. The bulk of this has been sold at \$2.75 per bag for No. 1 seed and \$2.50 for No. 2, although a considerable amount is yet to be moved. Fifty to seventy-five cars were expected here this year but the output was restricted by drought, and sales for seed purposes were interfered with by the low prices ruling in Old Ontario while prices in the North were high.

POTATO DISEASE INVESTIGATION OFFICER ACCEPTS NEW POSITION

MR. PAUL A. MURPHY, of the Field Laboratory of Plant Pathology, Charlottetown, P.E.I., has resigned his position as officer in charge of Potato Disease Investigation under the Dominion Department of Agriculture and will

take up work on April 1st as assistant with Dr. Pethybridge in the Division of Seeds and Plant Diseases in charge of plant pathological work in Ireland. His new address will be Royal College of Science, Dublin.

DIVISION OF CHEMISTRY

ELECTROLYTIC TREATMENT OF SEED GRAIN

BY DR. FRANK T. SHUTT, DOMINION CHEMIST

OUR examination of the Wolfryn Electro-Chemical process for the treatment of seed grain was made in 1917 and the results of the experiments carried on were published in *The Agricultural Gazette* for August 1918. These experiments furnish no evidence that the treatment is beneficial; neither the appear-

ance of the standing grain (wheat) nor the weight of the harvested grain lent any support to the claim made by the patentees that the treatment stimulates growth and produces conditions which result in increased yields.

Of course it is possible that the process of steeping and drying the

grain—apart from any alleged action of the electric current in the presence of certain chemicals—may stimulate germination, and that such accelerated germination may account for the beneficial results that apparently have been occasionally obtained on certain types of soil (heavy clay) under unfavourable seasonable conditions during spring.

In an exhaustive review by Dr. E. J. Russell, Director of the Rothamstead Experiment Station, of the results of field and pot experiments made in England in the electrolytic treatment of seed grain, that eminent authority concludes;

"The failure however of electrified seed to give any increase in yield under the carefully controlled conditions of an experimental station trial shows that the process lacks certainty ———. The writer is not prepared on present evidence to say that the process never succeeds, but the risk of failure seems so great that the farmer should look upon it as an adventure which may or may not prove profitable."*

This statement in our opinion very clearly and fairly indicates the position that must be taken by the scientists of the farm when considering the effectiveness and economy of the process.

TOBACCO DIVISION

INVESTIGATING TOBACCO EXPORT PROSPECTS

IN order to investigate the possibilities of overseas tobacco markets for Canadian grown tobacco Mr. F. Charlan, Chief of the Tobacco Division, has been sent to England and France by the Department of Agriculture to interview tobacco manufacturers there. His object is to find out exactly what quality of tobacco would be most suitable to British and French requirements and what quantities could be absorbed by these countries. This information

will be of value to Canadian tobacco growers in determining the acreage and character of their crop.

The tobacco industry in Canada is now at a point where it should be possible to establish a profitable export market and Canada is in a favourable position to compete with the United States product on the British market because of the British preferential tariff of thirty-two cents in favour of the Canadian product.

DAIRY AND COLD STORAGE BRANCH

THE TREND OF THE DAIRY INDUSTRY IN CANADA

BY J. A. RUDDICK, DAIRY AND COLD STORAGE COMMISSIONER

THE season of 1919 has established new records for Canadian dairying in several respects. We have increased our total production of milk and prices have been higher than ever before. The average for all grades of creamery butter delivered at Montreal works

out at a little over 53½ cents per pound. The quantity of creamery butter produced in 1919 was the largest of any year in the history of the industry and the output shows an increase in every province except Manitoba, where the labour situation interfered with the shipping

*Report on the proposed Electrolytic Treatment of Seeds before Sowing, by E. J. Russell, D. Sc., F.R.S., Journal of the Ministry of Agriculture, England, January, 1920.

of cream and caused more butter to be made on the farms.

In 1918 the average price per pound paid for cheese by the Dairy Produce Commission was 23.35 cents f.o.b. steamer at Montreal. While complete statistics are not available for 1919 the average price will be in the neighbourhood of 27½ cents per pound on the same basis. Owing to the unusual channels through which a large proportion of our cheese has been handled it has not yet been possible to secure exact figures for production or export for 1919. The receipts at Montreal were lower than in 1918 but a considerable quantity of cheese was exported to the United States through other ports, and the stocks on hand at country points are larger than they were at this time last year. Also the home consumption of cheese has increased very considerably during the year. When the figures are complete I believe it will be found that there was some decrease in the output of cheese but this has been offset by the increase of the output of condensed milk and milk powder, for the manufacture of which milk supplies were largely drawn from the cheese factories.

The growth of the condensed milk and milk powder industries during the war period has been the most notable feature of our dairy production. It is estimated that for 1919 the total quantity of condensed and evaporated milk will be nearly 110,000,000 pounds valued at approximately \$20,000,000. The total quantity of milk powder produced during the year amounts to 5,323,537 pounds valued at \$1,662,352. There has also been a large increase in the manufacture of ice cream and in the consumption of milk in the towns and cities. The fact is that the public is gradually beginning to realize that milk and its products, even at the advanced prices, are among the most economical foods on the market.

The total value of the milk produced in Canada in 1919, whether consumed direct or used in the manufacture of various products, amounts to over \$250,000,000 of which about \$65,000,000 was exported. These figures put dairying in the very forefront of Canada's industries. The details of the total dairy production in Canada in 1919 are given in round figures in the following table.

	Pounds	Value
Cheese.....	175,000,000	\$47,250,000
Creamery Butter.....	100,000,000	53,500,000
Dairy Butter.....	125,000,000	56,250,000
Condensed Milk.....	110,000,000	20,000,000
Milk Powder.....	5,323,537	1,662,352
Market Milk, Cream and Ice Cream.....		72,000,000
		250,662,352

The following table taken from the Monthly Bulletin of the Dominion Bureau of Statistics gives the number

of milch cows in each of the provinces of Canada in 1918 and 1919;

Province	1918	1919	Increase	Decrease
Prince Edward Island.....	41,429	45,662	4,233	
Nova Scotia.....	157,829	162,230	4,401	
New Brunswick.....	120,123	153,058	32,935	
Quebec.....	1,163,865	1,056,347		107,518
Manitoba.....	225,659	227,872	2,213	
Ontario.....	1,097,039	1,140,016	42,977	
Saskatchewan.....	352,989	374,062	21,073	
Alberta.....	328,702	336,596	7,894	
British Columbia.....	50,965	51,594	629	
Totals.....	3,538,600	3,547,437	*116,355	*107,518

It is probable that the figures from Quebec showing a decrease in the number of cows for that province are misleading. A new method of computing was adopted in 1919 which indicates that in 1918 and previous years the number of cows in the province was exaggerated so that the apparent decrease is not a real one. This is borne out by the fact that the official returns show a decided increase in the quantity of milk received at the Quebec factories in 1919. Quebec is the last place in Canada where one would expect to find any decrease in the number of cows. It would seem, therefore, that the actual increase for Canada is

much larger than the 8,837 cows shown according to the table. Also, there is a constant improvement in the average yield of milk per cow in Canada which amounts to a very large quantity every year.

There is every reason to believe that dairying will continue to be the most profitable branch of farming in eastern Canada. It is necessary that it should be the most profitable if there is to be continued expansion. It is the most exacting line of farm work that can be engaged in in this country having features which involve more or less hardships in many cases; if it were not so the business might soon be overdone.

COW TESTING WORK

BY A. H. WHITE, B.S.A., SENIOR SUPERVISOR, COW TESTING

THERE is no greater opportunity to increase production in any line of agricultural work than in the improvement of the average grade dairy herd. This improvement can be made only when the dairyman knows just what is the production of each cow in his herd. This he learns by keeping her records, which is commonly known as "Cow Testing."

The Dairy Branch has been carrying on this work under various plans since 1904 and the present plan has been in use since the spring of 1918.

It has been and is the policy of the Branch to make it possible for any farmer wherever he may be located, to take advantage of all the assistance which is offered in this most important work in the dairy business. Under

* The net increase in 1919 over 1918 is 8,837 milch cows. From the above mentioned authority we find that the total increase in milch cows, calves, and other cattle 1914 to 1919 is 874,151 head.

the present plan, the Dairy Branch employs an experienced man in each province, except British Columbia, to organize cow testing associations with the local creamery or cheese factory as a testing centre. The Branch supplies all the necessary blank forms, the sulphuric acid and preservative tablets and pays ten cents per test to any qualified person who is willing to do the work.

Last year there were 22,517 cows in 2,416 herds under test and recorded in connection with the organized efforts of the Branch. This was a slight increase in number of cows over 1918. Quebec had 10,374 cows under test which was the largest number in any province, and the work in Alberta and Manitoba nearly doubled which shows an increased interest in better dairying in the prairie provinces. In addition to this, there were many thousands of blank record forms supplied to men who tested their herds independently and were not connected with any organized testing centre, but were interested in the work through general propaganda.

The prospects for increasing the number of herds tested in 1920 are very promising. In Nova Scotia, there have been four or five new associations formed with a membership of about 25 farmers each. In Quebec, by the kindness and co-operation of the provincial Minister of Agriculture, the dairy instructors and agricultural representatives spent the month of March this year in propaganda and organization work among the farmers, and there are already reports of the organization of many new testing centres for the coming season.

In Manitoba the Extension Service of the provincial Department of Agriculture is cooperating in propaganda work through the boys' and girls' clubs in the schools; while, from the other provinces, many requests for blank record forms point to an increased interest in the work and a progressive spirit among dairy-men to improve their herds.

Cow testing has done much for the improvement of grade herds throughout the country and it has been estimated that, since the Branch first undertook the work, the average production per cow has increased by at least 30 per cent, which means that the total value of Canadian dairy products were increased by at least \$50,000,000. It is no uncommon thing to find grade herds with such a creditable yearly average as 8000-9000 pounds of milk, while there are individual grade cows recorded which give as high as 13,000 pounds of milk per year. The dairy farmers are realizing that it is practicable and possible to make a marked improvement in each generation of the herd by keeping records of the individual cows in that herd.

Cow testing means keeping individual records of milk and fat of each cow in the herd. Individual records supply information which will enable the dairyman to eliminate the "robber" cows and save the best producing females from which to raise the future herd. Many farmers have been able to get this knowledge and increase the average production of their herds through the cow testing work carried on by the Dairy Branch.

LIVE STOCK BRANCH

CANADIAN BANKS CO-OPERATE IN PROMOTING BOYS' AND GIRLS' CLUBS

BY P. E. LIGHT, B.S.A., CHIEF, MARKETS DIVISION

DURING the past two years a number of Canadian banks have made increased efforts to encourage and assist the boys and girls in the rural districts in the production of high class live stock and poultry. Their methods have been fairly well standardized and operations are being carried on in every province of the Dominion. In Part III of this number definite information relative to their activities is given

Under an agreement between the Canadian Bankers' Association and

the Federal Department of Agriculture, through the Live Stock Branch, prize money for live stock and poultry is contributed for boys' and girls' competitions at school fairs, local fairs and the boys' and girls' club fairs. The arrangement is that the Bankers' Association contributes fifty per cent while the Department of Agriculture provides the other fifty per cent of the total prize money contributed. In 1918 prizes thus contributed were competed for at points in the several provinces as follows:—

Provinces	1918	1919
Prince Edward Island.....	11	28
Nova Scotia.....	7	8
New Brunswick.....	4	3
Quebec.....	56	57
Ontario.....	175	183
Manitoba.....	59	81
Saskatchewan.....	53	55
Alberta.....	34	41
British Columbia.....	18	16
Totals.....	417	472

The total prize money contributed at these points in 1919 amounted to \$9,473, half of which was provided by the banks and half by the federal Department of Agriculture. In 1918 the banks contributed \$4,438, while a like amount was provided by the federal Department, making a total of \$8,876. This was a considerable increase over the amount provided in 1917 which totalled \$2,278.75

from each of the above mentioned sources.

An active part in this enterprise has been taken by the banks of Montreal, Nova Scotia, Toronto, Molsons, Merchants, Union, Commerce, Royal, Dominion, Standard, Hochelaga, Ottawa, Imperial, Sterling, La Banque Nationale, La Banque Provinciale, the Home Bank, and the Weyburn Security Bank.

SIRE PURCHASE POLICY

BY W. R. REEK, B.S.A., ASSISTANT LIVE STOCK COMMISSIONER

THE Dominion Live Stock Branch announces a new policy to be known as the Sire Purchase Policy which will become operative in the different provinces as announced later. The proposal of the policy is to encourage the replacing of the scrub by properly selected male animals and to provide an agency through which farmers may secure good pure bred sires with the least possible expense and difficulty.

Under the terms of this policy bulls, boars and rams will be purchased on order by competent employees of the Branch and will be sold to applicants at the original cost price plus the freight. A deposit of \$50 with the order will be required in the case of bulls and of \$10 in the case of boars and rams. All animals will be delivered subject to acceptance. If for any valid reason an animal is not considered satisfactory, the Live Stock Branch must be notified within three days after delivery. Any such complaint will be dealt

with promptly and, if necessary, the animal will be removed and the deposit and freight charges will be refunded. Upon expiration of the three day period, in the event of no complaint having been made the balance of the purchase price will become due.

In the event of a considerable number of applications being received from any one territory, exchange stables will be provided by the Branch for the assembling of the sires with a view to executing orders more promptly and for the purpose of giving applicants an opportunity of making their own selection out of the number on hand.

It will be noted that the new policy places the Branch in a position to assist farmers who are able to pay for bulls to secure same. It is, therefore, complementary to the distribution policy of the Branch under which bulls are loaned to farmers' associations, members of which are financially unable to secure good bulls for themselves.

APPOINTMENTS

A NUMBER of important appointments have been made in the Live Stock Branch recently. These include a scrub bull campaign organizer in the cattle division, a chief and two district men for the sheep division and several inspectors in the poultry division.

SCRUB BULL CAMPAIGN ORGANIZER

Mr. C. F. MacKenzie, B.S.A., has been appointed on the Cattle Division of the Live Stock Branch and holds the position of Organizer of the Scrub Bull Campaign for the province of Ontario. Under agreement, he works under direction of a committee composed of the Cattle Breeders' Asso-

ciation of Ontario and one member of the Ontario Department of Agriculture and one member of the Live Stock Branch, Ottawa. Mr. MacKenzie graduated from Guelph in 1919 and was immediately engaged by the Farmers' Magazine at Toronto, to conduct their Live Stock Department. Mr. MacKenzie was a member of the winning team at the Inter-Collegiate Competition at Chicago, in his senior year.

CHIEF OF SHEEP AND GOAT DIVISION

Mr. Angus A. MacMillan, B.S.A., recent Associate Professor of Animal Husbandry at Manitoba Agricultural College, has accepted the appointment of Chief of the Sheep and

Goat Division, Live Stock Branch, Ottawa. After graduating from the Ontario Agricultural College in 1912 Mr. MacMillan went to Macdonald College, Que., where he was placed in charge of sheep extension work in that province. Here he had considerable experience in organization and demonstration work. He organized the first co-operative wool growers' association in the Dominion and had charge of the marketing of from 170,000 to 200,000 pounds of wool annually from ten associations. After spending over five years in this work he resigned to take over the home farm which required his attention. Disposing of his farm a year ago, he accepted the position in Manitoba from which he has recently resigned in order to take up his duties in Ottawa.

DISTRICT SHEEP PROMOTERS

Mr. A. MacLaurin, B.S.A., has been appointed District Sheep promoter for Eastern Ontario. Mr. MacLaurin is a graduate of Ontario Agricultural College, Guelph, and previous to graduation he was engaged on farm drainage survey work at the College. Since graduation he has been connected with the Animal Husbandry Division, Macdonald College, Quebec, where he was engaged in lecturing on general live stock subjects, and was particularly interested in the extension work, giving a great deal of attention to co-operative marketing of wool and the general production of sheep. Mr. MacLaurin was winner of the Barton-Hamer gold medal in his senior year at Guelph, standing first on the team that was sent to Chicago International Live Stock Show.

Mr. S. G. Freeborn, B.S.A., graduated from the Ontario Agricultural College, Guelph, 1915, and as an under-graduate was engaged by the Dominion as assistant agricultural representative in Ontario. Subsequent to graduation he qualified for a commission and served overseas with the 20th Battery, C.F.A., where he received promotion to captain in August, 1917. In 1919, under the Khaki University he spent several months studying sheep as he found them in Great Britain. He also spent considerable time in the large woollen mills endeavouring to become more proficient in grading and sorting, and also learning something of the manufacturing of wool. Mr. Freeborn has been appointed District Sheep Promoter for Alberta.

POULTRY INSPECTORS

Among the men qualifying for the position of poultry inspectors for the Record of Performance work under the Federal Live Stock Branch are the following: Messrs. Zavitz, McKinstry, Wilson and Pollard from Ontario, Mr. Nuby from Manitoba, Mr. F. H. Ching and Mr. E. Nash from British Columbia. It will be the duties of these inspectors to visit the flocks of fowls which have been entered in the Record of Performance test, to handle each bird, examine the laying records, and report to Ottawa on these and the housing and feeding methods, and any other matters which may affect the health or egg production of the birds involved.

PART II

Provincial Government Departments

THE TREND OF THE DAIRY INDUSTRY

The falling off in production in cheesemaking, in some quarters, and butter-making in others, has created the unfortunate impression that the dairying industry is declining. It is recognized by the Dairy and Cold Storage Commissioner and other authorities that this is not the case. The cow stock in the country was never higher than at present, and at no time in the past has the feeding and care of the animals been more generally looked after. In order to obtain reliable data on the condition of the dairy industry, there have been brought together in the following symposium a statement from most of the provinces showing the trend of the dairying industry. The views of the Dairy Commissioner are published in Part I.

PRINCE EDWARD ISLAND

BY FRASER T. MORROW, DAIRY INSTRUCTOR

THE dairying industry of Prince Edward Island has established a new record both in quantity of milk produced and in the value of dairy products sold in 1919. New life has entered into the industry and there is no doubt whatever but that it will expand and develop if for no other reason than to supply the increased demand for dairy products. The prices for the coming year are uncertain but as long as control and rationing continues in the United Kingdom it is quite probable that the authorities there may desire to continue the purchase of dairy products at this end as they have done in the past two seasons. There is every reason to believe that returns for butter and cheese will be relatively high as compared with other farm products.

Reports on hand indicate that the large factories in this province are forging ahead while the smaller ones are gradually going out of business. Labour problems, high cost of supplies and keen competition are factors which help to bring this about. Consolidation of these small concerns will be essential if we are to continue the dairy business in anything like

the same ratio as has been done in the past.

We have now come to the period when we must centralize our creameries. There are four good reasons for this step, first, a large creamery can manufacture a pound of butter for less money than it costs the small one; second, better equipment and machinery and more up-to-date appliances are installed in the large plants; third, the best butter makers can be engaged and the best methods adopted because the business being done is sufficiently large to warrant it; fourth, a uniform quality of product is usually made in large creameries and the fact that carload lots can be shipped is a very decided advantage.

The developemnt of the dairying industry in the western part of the province is chiefly towards butter making but during the past few years the manufacture of cheese has been increased and with the large supplies of milk now available within a limited area the making of cheese is likely to be carried on more extensively in the future. The following comparative statement indicates the increased activity of the dairying industry in 1919 over 1918.

CHEESE

Milk supply 1918.....	23,397,012	lbs.
Milk supply 1919.....	27,918,314	"
Increase.....	4,521,302	

BUTTER

Milk supply 1918.....	14,678,675	lbs.
Milk supply, 1919.....	16,347,060	
Increase.....	1,668,385	

MILK SUPPLY

Butter and Cheese 1918.....	38,075,687	lbs.
Butter and Cheese 1919.....	44,765,374	
Total increase.....	6,189,687	

VALUE OF OUTPUT

	Gross	Net
Cheese 1918.....	\$ 538,503 03	\$ 426,688 13
Cheese 1919.....	659,045 40	566,525 15
Increase.....	120,542 37	139,038 02
Butter 1918.....	266,490 89	239,045 18
Butter 1919.....	410,189 60	379,703 00
Increase.....	143,698 71	140,657 82
Butter and Cheese 1918.....	\$ 804,993 92	\$ 665,733 31
Butter and Cheese 1919.....	1,069,235 00	946,229 15
Increase.....	264,241 08	280,495 84

NOVA SCOTIA

BY W. A. MACKAY, DAIRY SUPERINTENDENT

IN Nova Scotia in 1911, according to the census reports, there were, speaking in round numbers, 152,000 cows producing on an average 3300 pounds of milk per annum, making a total of 501,600,000 pounds of milk. In the year 1919, according to the estimates made by the Department of Agriculture and the Department of Immigration, based on report from a large number of correspondents in different parts of the province, the number of cows was 160,000 producing 3600 pounds of milk each, or a total of 576,000,000 pounds of milk, showing an increase since 1911 of 64,400,000 pounds of milk. This is probably the most authentic information that is available. However, to go further, in 1911 there were

about 275,000 pounds of butter manufactured in the creameries. This has increased to 2,093,000 pounds manufactured in 1919. Cheese making, however, has decreased almost to the vanishing point. The amount of ice-cream manufactured can be easily estimated at two or three times the amount manufactured in 1911. A survey of the towns and cities would also show an increased consumption of milk per head of population. The amount of butter manufactured on the farm has decreased some, but the discrepancy has been more than counteracted by the increase in the creameries. Taking it on the whole then, it appears as though the estimates given above would be practically correct.

NEW BRUNSWICK

E. P. BRADT, SECRETARY FOR AGRICULTURE

MARKED progress has been made in the quality of the dairy products produced in this province. Two years ago cheese buyers were afraid to touch the output of many New Brunswick factories. To-day the relationship between the buyer and seller is very satisfactory. The cheese is graded by Department officials and these grades accepted by the trade. This has resulted in a very marked improvement in the general quality of the cheese going on the market. New Brunswick cheese is fast approaching as high a standard as that put out by any other part of Canada. Marketing facilities were greatly improved by the organization of a Cheese Board in the spring of 1919. Every two weeks factory managers boarded their cheese and it was sold by auction on a competitive market, buyers from the larger firms being present to bid on the offerings. This system of marketing met with marked success. It was more satisfactory to both buyer and seller. The buyers could get their supplies without having to hunt all over the province for them. Higher prices were secured than would have been obtained under the old system of selling.

A dairy show and convention was held at Sussex early in December, 1919. Butter and cheese from nearly all the creameries and cheese factories in the province was on exhibition. These products represented the regular make of June, July, August and September. The cheese and butter was scored by competent judges and prizes awarded to makers and factories coming up to a certain standard. Much valuable information was obtained by the makers in comparing the quality of their product with that put out by other factories.

The Dominion Butter Scoring Competition was also entered into by a number of the creameries in the

province. The showing made in comparison with other provinces was very good and indicates that a high quality product can be produced in the province.

The policy adopted by the Department in encouraging and assisting the central creamery plan is proving sound. The Moncton Creamery, which began operations in 1918, in 1919 paid out nearly four times as much money to patrons as in 1918. The amount paid being \$37,735.45 in 1918 and \$144,761 in 1919. The number of patrons has increased from three hundred to six hundred. This creamery is rapidly forging ahead. The making of ice-cream was commenced during the past season. This part of the business will be enlarged considerably next year. The company will find it necessary to enlarge the whole plant in order to take care of the increased business. A chemical cold storage is being installed.

Attention is also being paid to the creamery at St. Hilaire in Madawaska county. The Department has been assisting in getting this creamery on a sound basis. The output was materially increased over 1918. Meetings were held during the present winter and an effort made to secure more patrons for next year. There is a splendid plant and equipment at this place and an unlimited market for butter at top prices. With a larger volume of business the creamery will soon be on a sound basis.

The establishment of these large central creameries has brought about a development in the dairy herds of the province. More and better cows are being kept as a result of the superior market for cream, which the creameries provide.

With the hearty co-operation of the milk producers, the makers, and the Department, the next few years will see a rapid development of the dairy industry in the province.

As an indication of the development of dairying in New Brunswick, the following statistics are suggestive:

BUTTER PRODUCTION

Year.	Cream-eries Reported.	Patrons.	Lbs. Milk Received.	Lbs. Cream Received.	Lbs. Butter Made.	Value Butter.
1919.....	17	1,692	3,088,668	3,154,700	915,816	\$ 504,602 22
1918.....	15	1,352	3,244,017	2,504,912	660,884	297,397 80
1917.....	14	861	801,660	719,238	500,050	199,686 33
1916.....	21	1,263	783,587	2,499,916	709,932	236,194 38
1915.....	20	1,235	858,681	2,792,955	776,416	231,837 82

Increase in 1919 over 1918, Butter manufactured, 254,932 lbs., Value, \$207,204.42.

CHEESE PRODUCTION

Year.	Factories Reported.	Patrons.	Lbs. Milk Received.	Lbs. Cheese Made.	Value Cheese.
1919.....	24	675	12,898,003	1,256,388	\$ 347,772 02
1918.....	..	..	12,111,317	1,174,362	264,304 05
1917.....	..	..	11,150,000	1,115,753	232,527 36
1914.....	24	555	10,168,839	1,022,026	138,714 73
1912.....	23	595	10,248,723	1,022,646	130,859 53

Increase in 1919 over 1918, Cheese Manufactured, 82,026 lbs., Value \$83,467.07.

ONTARIO

BY GEORGE A. PUTNAM, DIRECTOR

THE amount of milk and cream consumed in towns and cities has materially increased, also the amount of cream used for ice cream is growing yearly, while the milk used by condensaries and milk product factories has steadily advanced. In 1918 the output of Ontario butter was the largest in our history with evidence of still greater expansion taking place.

Although the output of Ontario cheese has decreased somewhat during the past few years we must not

conclude from this that Ontario's dairy industry is declining. The truth is that Ontario milk producers are finding more profitable markets for their product in other lines of manufacture. In addition to ice cream, condensed milk, butter, cheese, etc., a considerable amount of milk is being used in the manufacture of milk chocolate and other milk products.

The following table shows the value of Ontario dairy products for 1919,—

Value of Ontario Dairy Products for 1919.

	lbs.		Value.
*Butter.....	31,900,000	at 55c. per pound.....	\$ 17,545,000
*Cheese.....	102,700,000	at 27c. ".....	27,729,000
†Milk and Cream for city milk supply and used by producers, together with cream used in making ice cream and manufactured into butter on the farm			25,000,000
†Output of Condensaries and Milk Powder Factories.....			10,000,000
Total.....			\$ 80,274,000

* Actual returns for the ten months and a close estimate for two months.

† A conservative estimate.

MANITOBA

BY. L. A. GIBSON, DAIRY COMMISSIONER

IF there is any occasion for pessimism in the dairy industry of Manitoba, we have failed to discover it. During the year just past every individual engaged in the industry, no matter what branch he represented, had to meet the obstacles that confronted his individual work, and the united efforts of the individuals brought the industry through the most difficult year ever experienced by the dairymen in Manitoba, stronger, more determined, and better prepared for still bigger problems which are sure to confront us in the years to come.

The shortage of labour suitable for dairying, and the high price of grain, militated against the production of dairy products. The unsettled labour conditions which started and lasted for six weeks completely tied up express shipments, consequently the farmers could not ship their cream, resulting in the several butter factories in Winnipeg closing for that period. Creameries in other parts of the province were also seriously affected. During this time calves were allowed to run with the cows,

and the production of dairy products was curtailed for the balance of the year. But in spite of all these disadvantages the dairy industry in Manitoba has made substantial progress during the year.

In the year 1912 it was necessary to bring into the province 55 carloads of creamery butter to meet our market requirements. During the year 1919 we not only produced enough creamery butter to supply our market, but we shipped out of the province 153 carloads, representing 60,000 packages or 3,360,000 pounds, valued at \$1,814,400, and if conditions had been normal in Winnipeg during May and June the production would have been largely increased.

As the volume of creamery butter production is perhaps the most accurate indicator we have of the development of dairying from year to year, a few figures are given below to gauge this development. Following are the number of creameries operated in the province, the output in pounds, average price, and the annual increase for the past eight years:—

Year.	No. of Creameries.	Butter output Pounds.	Average Price Per Pound.	Selling Value Creameries.
			cts.	\$ cts.
1912.....	20	2,931,138	28.0	820,718 64
1913.....	36	3,929,622	27.5	1,080,646 05
1914.....	35	4,761,355	26.5	1,261,759 07
1915.....	35	5,839,667	29.0	1,693,503 43
1916.....	37	6,574,510	31.0	2,038,098 10
1917.....	41	7,526,356	38.5	2,897,647 06
1918.....	42	8,450,132	45.0	3,802,559 40
1919.....	44	8,256,711	54.0	4,458,623 94

The following table gives the quantities, average prices and values of milk and milk products for the year 1918 and 1919:

Product	1918 Pounds.	1919 Pounds.	1918 Price.	1919 Price.	1918 Total Value.	1919 Total Value.
			cts.	cts.	\$ cts.	\$ cts.
Creamery butter	8,450,132	8,256,711	45.0	54.0	3,802,559 40	4,458,623 94
Dairy butter....	9,703,337	10,804,225	37.0	44.0	3,590,234 69	4,753,859 00
Cheese.....	973,612	679,855	21.8	26.4	212,247 41	179,481 72
Total.....	19,127,081	19,740,791			7,605,041 50	9,391,964 66
Milk.....	147,787,040	150,625,021	2.0	3.9	2,955,740 80	5,874,375 81
Sweet Cream in lbs. butter fat.	2,315,832	2,457,342	53.0	62.0	1,227,390 96	1,523,552 04
Total.....					11,788,163 26	16,789,892 51

SASKATCHEWAN

BY P. E. REED, DAIRY COMMISSIONER

DAIRYING in Saskatchewan has been a child of many adversities but if Nature's law of the survival of the fittest is existent and operative in this connection, the industry must have every right to a prominent place in our agricultural development, for the trend of dairying in Saskatchewan is decidedly upward.

Saskatchewan has been heralded as a great wheat growing province, the bread basket of the empire, etc., and until very recent years little has been said or thought of her possibilities as a stock raising or dairying territory. Consequently, a very large percentage of the settlers coming into the province in those early years, not only had no intention of engaging in dairying but many expressed a decided aversion to it. In farmer's meetings the expression was common, 'we came to Saskatchewan to get away from milking cows'. Today that condition is greatly altered; we have turned the corner in dairying and a considerable percentage of our most progressive farmers are proud to be classed as dairymen, realizing that the develop-

ment of the dairy and live stock industry is just as essential to a permanent system of agriculture on the Saskatchewan prairies as in eastern Canada, and also realizing that the cream cheque is the most dependable income within reach of the prairie farmer.

Speaking more specifically, the development in dairying in this province has of late years been in butter and ice cream manufacturing and supplying a largely increased demand for milk and cream for local consumption.

Previous to the organization of Saskatchewan as a province, some fourteen cheese factories were established in the territory, now included in the province, but for one reason or another these had all ceased to operate previous to 1906 when the dairy branch was established in connection with the provincial department of agriculture. The conditions of sparse settlement and comparatively small herds, generally existing in Saskatchewan, do not lend themselves to the development of the cheese industry, and for some

years past only one small factory has been in operation.

No condenseries have as yet been established in Saskatchewan but development is now being considered by some firms with a view to handling the summer surplus of milk received from the large number of patrons who must be retained in order to secure a sufficient amount to supply the demands of the winter trade.

Complete figures are not available with regard to the ice cream trade, but seven creamery companies who manufacture ice cream, report an output of 539,810 gallons during 1919. This was an increase of approximately 50 per cent over the output reported by these firms for the previous year. There were in addition to this, thirty-two firms or individuals who manufactured ice cream for local trade, but from whom detailed reports were not received.

Most conclusive evidence of the upward trend of dairying in Saskatchewan is found in a review of the figures of creamery output in recent years. The following figures show the yearly production of creamery butter for the five years 1915 to 1919:—

1915.....	3,848,852 lbs.
1916.....	4,287,958 "
1917.....	4,220,758 "
1918.....	5,009,014 "
1919.....	6,598,000 "

In 1917 there were 33 creameries in operation. In 1918, five new plants were started and the output of 5,009,014 recorded that year, shows an increase of 18.70 per cent over 1917. In 1919 there were 42 creameries in operation and the output as above shown is 31.72 per cent greater than that of the previous year.

A feature of the progress of recent years is a great interest and development in dairying in the southern open prairie sections of the province and there is every evidence that the men in these sections will not only continue in the business, but that the herds of milking cows in Southern Saskatchewan, will increase in both size and number.

Recent discoveries as to the possibilities of securing winter succulence by the growing of sunflowers and the practicability of storing these and other feeds in the silo, bid fair to assist greatly in solving the problem of economical winter production. A rapidly growing interest in individual cow-testing and better methods of feeding and herd management are all evidences of the trend of the times in Saskatchewan dairying.

Six new creameries are assured for the coming season and, though the present winter has been a hard one on the dairyman, there is a decided feeling of optimism amongst both dairymen and creamerymen in all parts of the province.

ALBERTA

BY J. McCAIG, EDITOR OF PUBLICATIONS

THE dairy business in Alberta has not declined any during the past few years. The cheese business has never attained great volume in this province. It is not popular because it requires the whole of the milk. Butter making and cream selling leave a valuable feed residue in skim milk or butter-milk which is valuable for the rais-

ing of calves and hogs, and everyone has been trying lately to increase their cattle, which can better be done by selling cream than by selling whole milk. The total value of dairy products for the past ten years is as follows:—

TOTAL VALUE OF DAIRY PRODUCTS—	
1910.....	\$ 7,855,751 00
1911.....	12,971,989 15

TOTAL VALUE OF DAIRY PRODUCTS—*Con.*

the same period is given below:—

1912.....	12,646,532 57
1913.....	13,405,324 52
1914.....	14,611,803 72
1915.....	15,895,586 00
1916.....	18,466,311 00
1917.....	24,794,597 00
1918.....	27,500,000 00
1919.....	31,625,000 00

PRODUCTION OF CHEESE—

1910.....	220,000 lbs.
1911.....	100,000 "
1912.....	40,000 "
1913.....	70,716 "
1914.....	70,581 "
1915.....	381,632 "
1916.....	745,122 "
1917.....	1,274,905 "
1918.....	552,834 "
1919.....	500,000 "

The production of cheese during

PROVINCIAL TRACTOR POLICIES

During recent years the tractor has come to fill an important place in the agriculture of several of the provinces of Canada. In order to encourage the use of tractors and to make these machines more valuable to their owners a number of the provinces conduct demonstration schools and service stations and otherwise afford assistance to farmers who use tractors. The policies vary in the different provinces but their object in each case is identical, namely, to encourage the employment of the tractor where its use is practicable and where it will assist in greater production of foodstuffs. It is with a view to presenting these policies for comparison by agricultural officials interested in the use of tractors that the following articles have been assembled and published.

NOVA SCOTIA

TRACTORS IN AGRICULTURE

BY DR. M. CUMMING, B.S.A., LL.D., SECRETARY FOR AGRICULTURE

IN the spring of 1918, the Nova Scotia Department of Agriculture co-operated with the Canada Food Board in facilitating the purchase and distribution of Fordson tractors. Seventeen of these tractors were disposed of. At the same time the Department sent to Dearborn, Mich, a tractor man, who, through the courtesy of Henry Ford, spent several weeks in the tractor plant familiarizing himself with the details of the construction of the tractor. On his return to Nova Scotia his services were offered free to all parties who had purchased tractors and they used him to quite a large extent.

Since 1918, a very considerable number of tractors have been pur-

chased by farmers in various sections of the province. At least five different makes have been sold, all by companies which now have service station in the province. Consequently it was felt that there was no occasion to continue a public service station. However, for the past three years, instruction in tractors has been given as one of the features of the annual short course held at the Nova Scotia Agricultural College. During the 1920 short course, just completed, upwards of forty students took this special course. The public have also been advised that should the demand arise, a further special course will be provided at the Agricultural College at any time.

QUEBEC

DEPARTMENTAL TRACTOR POLICY

BY NARCISSE SAVOIE, SECRETARY FOR AGRICULTURE

IN ORDER to facilitate the introduction of tractors to the farmers of Quebec the Department of Agriculture has made arrangements whereby the farmers are able to procure these machines through the government. On November 5, 1919, the provincial Department of Agriculture entered into a contract with a tractor company under which the company guaranteed a special price to the farmers of Quebec provided the orders for the tractors are sent to the company through the Department.

The company agreed to establish an organization throughout the province for the operation of the machines and the sale of spare parts. All transportation and demonstration expenses are paid by the company. The Department also made arrangements to supply a plough specially suited for use with the tractor adopted. This plough cuts a furrow ten inches wide and from three to nine inches deep.

With a view to encouraging the purchase of tractors on credit the Banque Nationale of Quebec agreed,

at the request of the tractor company to advance the amounts necessary for the purchase of a tractor with accessories to any reliable farmer. These advances are made through any one of the bank's two hundred and seventy-two branches, the managers or assistant managers of which are authorized to lend the required amounts under certain conditions. Interest at 7% is charged on three to six month loans and 8% on loans extending from six to nine months.

The tractor company arranged to carry on short winter courses of one week on the management of tractors at sixteen different points in the province. Instruction is given on the operation of the tractor, the care of the machine, and its construction. Tractor demonstrations are given by the company's mechanics, while instruction on the handling of the plough is given by a representative of the firm manufacturing them. The subject of belting for pulleys is dealt with by a representative of a rubber company. The courses which have been held so far have been well attended.

ONTARIO

TRACTOR COURSES AND OPERATION

BY W. BERT ROADHOUSE, DEPUTY MINISTER

TWO short courses on tractors were conducted by the Ontario Department of Agriculture this year. The short course held at the Ontario Agricultural College in January and February was attended by about 160 students and many applicants had to be refused admission on account of lack of accommodation. The short course at the Kemptville agricultural school was well attended, by farmers who availed themselves of the opportunities there

given for the study of tractors and their operation. In addition at these two courses special men were assigned to give lectures on the subject to the agricultural schools which were held by the agricultural representatives in the different counties of the province. This is the first time special lectures on tractors have been included in the programmes of these agricultural classes, and very keen and general interest was taken in the subject.

The Department of Agriculture has not been operating tractors since the fall of 1918. This work was carried on during two years, 1917 and 1918, and the Department divided the province into zones or districts each zone being supplied with a tractor mechanic who was placed in charge of from eight to fifteen tractors. This man was supplied with a car, a kit of tools, and some of the smaller repair parts. His duties were to keep the tractors in a good state of repair. He was what probably might be called a 'trouble man' and adjusted difficulties when the

operators could not make the tractors work successfully.

At the conclusion of the ploughing season of 1918 one hundred and twenty-nine tractors which the Department owned were stored at central points in the province and four or five of these tractor mechanics overhauled the machines and put them in selling condition. Several of these men were kept on during the past season attending to the repairs and overhauling of the tractors of which fifteen or twenty have been sold. At the present time there are no tractor experts or mechanics in the employ of the Department.

MANITOBA

TRACTOR EXTENSION SCHOOLS

BY S. T. NEWTON, DIRECTOR, AGRICULTURAL EXTENSION SERVICE

THE most popular extension schools conducted in Manitoba are those on gas engines. This is the fourth season that this work has been carried on and the demand seems to be keener than ever.

For the past two seasons the schools were arranged in three circuits, and a carload of equipment consisting of two or three tractors and several stationary engines ranging from a half horse power to a four horse power was employed for instruction purposes. The course extended over a period of two weeks and approximately 40 per cent of the time was given over to instruction on agricultural subjects and the balance of the time to gas engines. It was found that invariably those in attendance were there for the gas engine work, and the agricultural instructors were working under a considerable handicap. This year the gas engine and the agricultural work was separated, and as all the time on one section is devoted to gas engines it is possible to cover most of the work in five days. Instead

of taking along a carload of engines, arrangements for schools were made early in the season, and it has been possible to arrange for sufficient engines at each place.

The instructors take with them a considerable quantity of gas engine parts, such as carburetors, magnetos and mixing valves. They also have good charts, lantern slides and other illustrative matter.

The attendance at each course runs from 40 to 80. Where the advance enrolment is over 40, three instructors are provided. For less than 40, two instructors generally prove sufficient. The men employed for this work are generally connected with the various gas engine companies in the capacity of experts, and have given uniform satisfaction as lecturers and demonstrators.

The Department of Agriculture pays the salary, travelling and living expenses of the instructors, and the local community provides a well heated and well-lighted garage, secures engines and takes care of all other

local expenses such as draying, gasoline, heating, etc. Usually an enrolment fee of \$1 or \$1.50 is sufficient to cover all expenses.

Altogether 40 of these extension schools were arranged. Twenty have already been held and if the present rate of attendance keeps up, the total enrolment will be approximately 2000.

In addition to the course put on by the Extension Service, the Manitoba Agricultural College conducts an eight weeks course at the college. As only 100 students can be accommodated, there is always a long waiting list for this course. In addition to the gas engine work, considerable instruction is given in woodworking, and forging.

SASKATCHEWAN

THE TRACTOR IN AGRICULTURE

BY W. A. MACLEOD, EDITOR OF PUBLICATIONS

FOR a number of years the University of Saskatchewan has been holding short courses on internal combustion engines, including automobiles. These courses are given under the direction of the Department of Agricultural Extension and are generally of three weeks duration, and it is expected that each student will in that time reach an understanding of the practical care and operation of both stationary and traction engines and automobiles. Practical work can be extended for a longer period to suit the requirements of the students.

A new tractor laboratory of 145 by 75 feet has been added to the engineering building, which provides ample room for operating and testing a large number of tractors under comfortable conditions in the winter. The practical work is graded so that the student can be brought on step by step. Charts and demonstration models make the lectures easily understood. The courses consist of two or three lectures in the afternoon, the morning being entirely devoted to practical work.

The course covers: Principles of the internal combustion engine; two and four cycle engines, the conditions of compression and expansion; parts of the engine and their functions; cooling systems, ignition system fuels, their evaporation and treatment; the carburetor and its functions;

types of carburetors; lubrication and mechanical lubricators; the timing and adjusting of gasoline engines, traction engines and automobiles including clutches and transmission gears, differentials, etc.; engine trials to develop the maximum horse power, and economy trials.

The attendance in each class is limited to fifty. Each student pays a fee of \$5 a week and the text book used costs \$2. The classes are under the direction of A. R. Greig, professor of agricultural engineering; J. McGregor Smith, professor agricultural engineering; E. A. Hardy, assistant professor engineering.

These courses have proved exceedingly popular and have been largely attended. In addition to these, courses in gas tractors and motor mechanics have been given at the university during the past two years for disabled soldiers. A new class is commenced every month, 12 to 20 new students entering each month. The farm motors course is a four months course and includes both engine and motors with a thorough training in all that pertains to electrical ignition, valve timing and testing, with thorough study of thirteen different types of engines, tractor testing and field operation on the University Farm as the final test of the student. Blacksmithing, babbiting and soldering, machine shop and repair work are the branches where

the students are given the same painstaking, thorough instruction.

In connection with this course there is a four months course in farm machinery including the different types of ploughs, discs, binders, mowers, etc., a wide range of these different models being available for the purpose.

In 1914 owing to many complaints from farmers in all parts of the province and at the request of the Grain Grower's Association, the Saskatchewan Legislature appointed a commission of inquiry into agricultural implement sales, this commission reporting to the House in June, 1915. The commission was composed of Judge Newlands, Judge Lamont, the Hon. W. F. A. Turgeon, Attorney-General for Saskatchewan, W. R. Motherwell, Minister of Agriculture for Saskatchewan, and Mr. J. Maharg president of the Saskatchewan Grain Grower's Association. The commission found that the grounds for complaint were many and various, regarding the sale of power outfits, and suggested that the contracts then in use should be amended in such a manner that the vendor and purchaser should receive a more equitable distribution of protection as the contract, as framed, protected the vendor almost exclusively. The commissioners made several recommendations, the following being amongst the most important: That the contract contain such detailed warranties as to the capabilities of the machine as will remove the main opportunities for misrepresentation which now exists, and further that the ordinary rules of law governing the liability of principals for their agents be made to apply to the sales of farm machinery. That a statutory contract be adopted in which the selling companies will give proper warranties concerning the construction, operation, and durability of the machines sold, and that the farmers can, upon application, obtain necessary repairs at a place to be specified in

the contract, that all dealings with the homestead will be invalid unless with the consent of the owner's wife.

The Farm Implement Act based on this report was passed at the next session of the legislature, and largely as a result of the powers of the Farm Implement Act, litigation between the farmer and the implement company has been removed almost to the vanishing point.

The act was designed to protect the farmer not so much against the companies as against unscrupulous agents. Formerly the contract made at the sale of a large instrument, frequently contained a clause protecting the company from statements and representations of its agents, but a clause to this effect may not be inserted in the contract. The most important feature or clause of the act is that regarding warranties: "The purchaser of a 'large' implement, which means a traction or portable engine, a separator, engine ploughs or discs, finding that any machine does not work satisfactorily, may require the vendor to come and make it perform well, and if he fails to do so the purchaser may reject the machine and may receive back all moneys or notes given by him for it, or he may retain the machine and hold the vendor liable for the difference between the value of the machine as it is and the value it would have had if it had fulfilled its warranty, the valuation to be settled by arbitration."

All vendors selling or offering for sale large implements in Saskatchewan shall file with the minister of agriculture on or before the first day of February in each year a list of the large implements which they have for sale, with a description of each said implement, showing in the case of engines the horse power of the same, both at the brake and on the drawbar, and in the case of implements driven or operated by engine power the amount of horse power

required to drive or operate such implement.

Up to the present time, it has seldom been found necessary to put the act into force, the mere fact of the existence of the safeguards provided

by the act having been found sufficient to prevent injustice. Moreover the act has worked out so satisfactorily that few amendments have been necessary.

NEW BRUNSWICK

AGRICULTURAL SHORT COURSES

THE first agricultural short course held in the Moncton section of New Brunswick was conducted during the last two weeks of February by J. H. King, agricultural representative for Westmoreland, Albert and Kent counties. He was assisted by members of the provincial staff at Fredericton and by two representatives of the Federal Live Stock Branch located at Moncton. Twenty-nine boys and young men ranging from fifteen to thirty years of age were enrolled and the average attendance was fair. At the close of the course a young farmers' club was

organized and the Department of Agriculture proposes interesting the members of the club in conducting experiments, competitions, debates agricultural picnics, etc.

The agricultural short course held at the office of the agricultural representative at Chatham, N.B., had an enrolment of thirty students and on Seed Fair Day seventy farmers were present for the lectures. This course was conducted during the latter part of February and in addition to the agricultural representative outside lecturers assisted with the work.

QUEBEC

AGRICULTURAL LEGISLATION

BY J. A. GRENIER, DEPUTY MINISTER

DURING the session of the Quebec legislature, which has recently ended, four bills concerning agriculture were adopted.

Through Bill No. 32, which is an Act to amend the Revised Statutes of 1909, respecting co-operative agricultural associations, the value of the shares in such associations is increased from \$10 to \$20 payable in four yearly instalments of \$5 each year, or as the association may decide by by-law. No member shall be allowed to hold less than \$20 of capital stock nor more than \$1,000 in same. Representation by proxy through an officer or employee of the association shall be null and void. A penalty of \$5 per day for neglect or refusal to provide the association's statement after the

required date is added to article 1987 of the original statute, and the director or manager of the negligent association is liable to a similar penalty.

Bill No. 34 is an Act to amend the Quebec Municipal Code respecting drainage. To the original Act, Chapter 9 consisting of seven sections having thirty-one articles is inserted. These amendments with respect to the drainage of agricultural lands cover the necessary preliminary formalities, work done by mutual consent, proceedings when there is no agreement, and maintenance of ditches and drains. The provisions of this chapter apply only to ditches costing not over \$1,500 for construction. A penalty of \$25 or eight days

imprisonment is incurred by any person who interferes, injures, or prevents the execution of the work being done by the special superintendent who shall be named to supervise the work in case the ditch must cross eight or more lots.

An Act respecting Loans by Municipalities for the carrying out of drainage work is Assembly Bill No. 35. It is cited as *The Drainage Act* and makes provision whereby the council of any town, village, or rural municipality may borrow, by by-law, sums of money not less than \$2,000 nor more than \$50,000 to use in draining land situated within the limits of its jurisdiction. The following provisions are stipulated. Not less than \$50 nor more than \$1,000 may be advanced to any one farmer. Applications for advances shall be considered by the council in the order in which they are received in the office of the secretary-treasurer of the municipal-

ity who must note on each the date and hour received. No advance shall be made by the council until a detailed report, by a competent inspector of drainage, is made and then it shall not exceed 75 per cent of the cost. The Act outlines proceedings to be taken by the farmer in securing an advance and by the council in borrowing money for the purpose of the Act.

By Assembly Bill No. 241 clear definitions are incorporated in the Dairy Products Act in the revised statutes of 1909. The amendments include the striking out of certain words and the addition of others in five articles of the original Act.

APPROPRIATIONS

The following appropriations were voted to supplement the amounts voted last year for the year ending June 30, 1920.

Agricultural societies.....	\$	115,000
Farmers' clubs, encouragement of agriculture in general, land clearing competitions, conferences on agriculture, etc.....		44,000
Agricultural schools.....		3,000
Domestic science schools.....		3,000
Dairy school of St-Hyacinthe, and work on the farm.....		7,000
Dairying and inspection of dairy produce factories.....		15,000
Horticulture.....		5,000
Official laboratory of the province of Quebec.....		3,000
Poultry-keeping.....		5,000
Total.....	\$	200,000

The following sums were voted for the year ending June 20, 1921.

Agricultural societies.....	\$	100,000
Farmers' Clubs.....		100,000
Encouragement to agriculture in general.....		334,500
Agriculture and horticultural society of Montreal.....		500
Pomological and fruit growing association of the province of Quebec.....		500
Council of agriculture.....		3,000
Agricultural schools.....		40,000
Veterinary instruction.....		6,000
Domestic science schools.....		18,000
Dairymen's association of the province of Quebec.....		2,000
Dairy school of St-Hyacinthe, work of farm and official laboratory of the province.....		22,000
Dairying and inspection of dairy produce factories.....		130,000
Horticulture.....		15,000
Journal of Agriculture.....		27,000
Poultry.....		15,000
Provincial agricultural merit.....		4,500
Fairs and exhibitions.....		32,000
Total.....	\$	850,000

WORK IN BEAUCE COUNTY

BY P. ST. HILAIRE, B.S.A., DISTRICT AGRICULTURIST

IN the county of Beauce practically all of the ordinary farm crops are grown and all classes of live stock are raised to some extent. I devote my time to the promotion of all branches of the agricultural industry. My time is spent in visiting farmers' clubs, urging better sanitary conditions in

stables, establishing school gardens assisting in the organization of fairs, organizing for practical demonstrations on the manufacture of maple sugar and maple syrup—one of the most profitable industries of Beauce county—establishing and looking after demonstration fields.

ONTARIO

CO-OPERATIVE EXPERIMENTS IN AGRICULTURE

BY DR. C. A. ZAVITZ, DIRECTOR, ONTARIO AGRICULTURAL AND EXPERIMENTAL UNION

THIRTY experiments in agriculture will be carried on by the Ontario Agricultural and Experimental Union this year. These include nine variety tests with agricultural crops including oats, barley, and emmer, hulless barley, spring wheat, buckwheat, field peas, spring rye, soy beans and Flint and Dent husking corn; five tests in varieties of roots including mangels, sugar mangels Swedish turnips, field turnips and carrots; seven tests with forage, fodder, silage and hay crops including variety of sorghum, sweet clover and alfalfa and comparing crops of different classes that are similar in physical properties also in comparing the planting of corn at different distances and in testing unhulled, hulled and scarified sweet clover seed. The experiments also include tests with such culinary crops as varieties of field peas and of dates of planting sweet corn for table use.

Fertilizer experiments include four different tests. Four miscellaneous experiments include testing northern and southern grown seed potatoes,

testing two varieties of potatoes, three grain mixtures for grain production and three grain mixtures for fodder production. Provision is also made for supplying members of the union living in Ontario with from one to five pounds of any one of several choice varieties of farm crops for sowing on his home farm. These include O.A.C. No. 72 oats, O.A.C. No. 3 oats, O.A.C. No. 21 barley, Marquis spring wheat, emmer, O.A.C. No. 61 spring rye, buckwheat, Whitecap Yellow Dent Corn, Wisconsin No. 7 corn, Salzer's North Dakota Flint corn, Gold Nugget Flint corn, Golden Bantam sweet corn, Potter's field peas, Pierce's Improved field bean, O.A.C. No. 81 Soy bean, Green Mountain potato, Irish Cobbler potato Yellow Leviathan mangel seed and Grimm alfalfa.

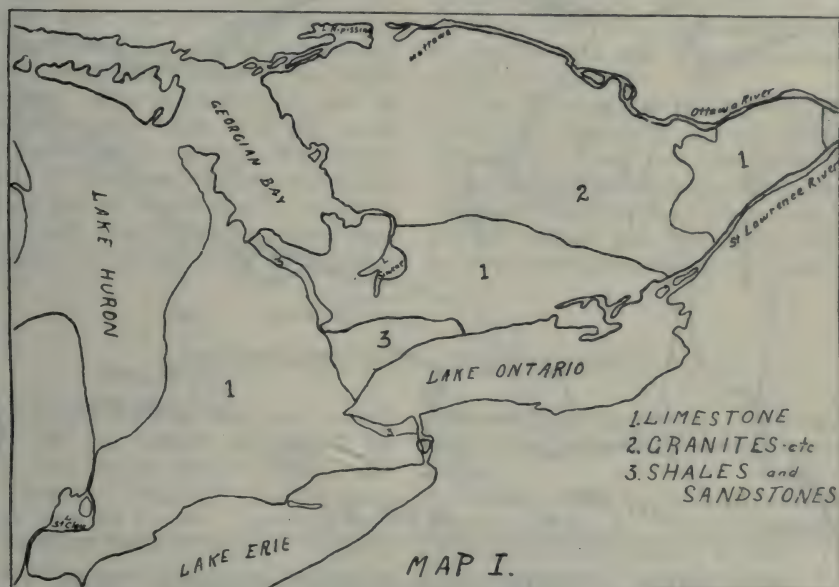
Members of the union residing in other provinces of Canada may select any of the experimental material offered except fertilizers and those concerned with potatoes and grain mixtures for grain and fodder production.

SOIL SURVEY WORK

DURING recent years a survey of soils in Ontario has been conducted by the chemistry department of the Ontario Agricultural College with funds provided by *The Agricultural Instruction Act*. The purpose of this survey is to map out the soils of the province as a foundation upon which to base the final work, the planning of a system for maintaining or building up the fertility of all types of soils of the entire province.

to the manner in which the rocks were changed into soil. The grinding process was brought about largely by glacial action. The two great depositing agents of Ontario soils were the glacier itself and the glacial lakes which resulted from the accumulation of water provided from the melting glacier.

Map II shows the part of the province which was covered by the water of these lakes and the areas marked 2 in each case show the parts of the



MAP INDICATING THE ORIGIN OF THE SOIL IN VARIOUS DISTRICTS OF ONTARIO

Many factors are to be considered in mapping the soils. First, types having distinct practical values and characteristic working qualities must be set. The qualities of these standards depend largely on two factors, origin and environment. The origin involves the science of geology and is indicated in Map I which shows Ontario divided into districts according to the class of rock that has been most important in the formation of the soils of the various sections.

The second factor, environment or existing conditions, has reference

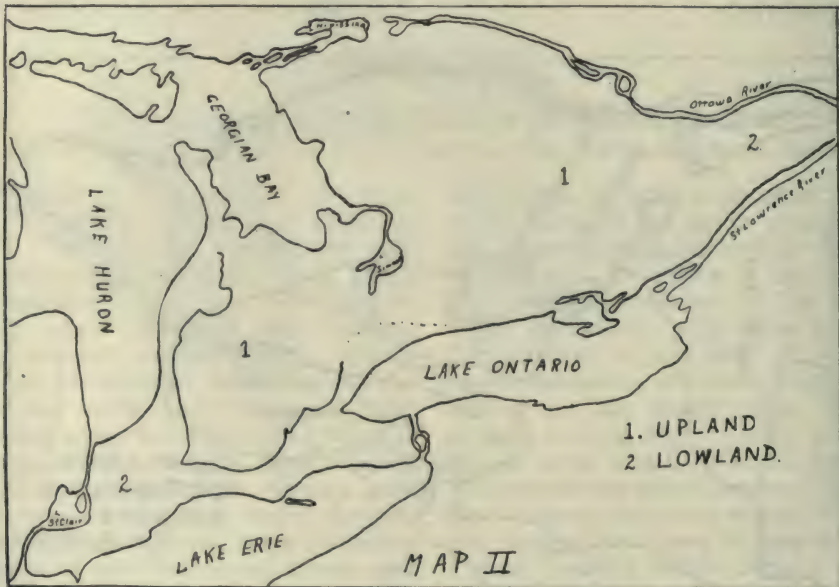
province which were formed from deposits of sediment. These areas were at one time lake bottoms. The soils of the upland marked I are more complicated and more difficult to map. They are the rough, hilly areas frequently sandy, gravelly, or stoney, but, in addition there are wide areas of clay loams, silt loams and clays which were either ground moraines, or deposits resulting from the existence of small lakes which remained within the upland.

Besides the surveying work that is done in the field, the soils are

analyzed both physically and chemically. The physical analysis has reference to the size of the grains making up the soil while the chemical analysis deals with its chemical composition.

When the type has been studied in the field and analyzed physically to determine something of its natural drainage, also analyzed chemically so as to further study its composition and potential fertility we have a

by the department of chemistry. In the second method the experiments are established with farmers upon typical soil under ordinary farming conditions. The department supplies the fertilizer and applies it with the assistance of the farmers, and the amounts of the crop yields are secured with their co-operation. Since the experiment is half his, the farmer is interested and familiar with it, and the experience leaves him more widely



AREAS MARKED "2" ARE THE RESULTS OF DEPOSITS OF SEDIMENT. THOSE MARKED "1" ARE THE COMPLICATED UPLANDS

considerable amount of information regarding the type. However it is necessary to follow up this analysis with practical experiments in the fields to determine the best rotation, the most suitable crops, and the most profitable use of fertilizers on the various farms. This has been and is being carried out in two ways. First, land which is typical of a standard type and suitable in various ways is rented and operated entirely

informed. Experiments carried out upon rented plots permit experiments in a detailed way such as the average farmer is not prepared to do. This is necessary for successful results from our work.

Through careful surveying, analyzing and experimenting we are building up a soil survey which will enable us to work out a system of replenishing depleted soils and maintaining the fertility of Ontario farms.

SCRUB BULL DISPOSAL

BY J. L. DOUGHERTY, B.S.A., AGRICULTURAL REPRESENTATIVE

A COMPETITION has been arranged among the fifty farmers' clubs of Kent county to secure the satisfactory disposal of the largest number of scrub bulls in the county of Kent within the next two months. Eight cash prizes will be given to the clubs standing highest. It is expected these will range as follows,—\$75, \$60, \$50, \$40, \$30, \$20, \$10, and \$5. The various banks in the county are putting up the money for the prizes and the number and amounts of the prizes will depend on the amount of money secured from the banks. The rules governing this competition are as follows:—scrub bulls are all bulls over ten months of age not registered; 2, the competition will close the last day of April and in order to have a bull credited in the count the secretary of each club competing

must by that day supply the Department of Agriculture at Chatham with an affidavit from each owner showing that he has altered or sold for slaughter the animal in question.

In order to encourage farmers to purchase pure-bred bulls of high merit it is planned to maintain an exchange stable at a central point in the county, if the applications for bulls are numerous enough to warrant it. Bulls will be purchased by the government and assembled at this point. The Dominion Department of Agriculture will bear the expense of the exchange.

The Agricultural Society of Chatham has offered a special prize of \$50 to be given for the best bull (Beef Breed) purchased after January first and exhibited at their fair. A similar award has also been offered by the Blenheim society.

OXFORD COUNTY WINS TROPHY

OXFORD county this year carried off the trophy presented by the Union Stock Yards and the Canadian Packer's for the best county judging team. The final test was between Oxford county, winners at Guelph in December, and Carleton county, winners at Ottawa in January. The totals in the final competition were 2,223 points for Oxford and 1,948 for Carleton. The competition was in charge of R. S. Duncan, B.S.A., while professors Wade Toole and W. J.

Bell officiated as judges. The teams with their individual scores were as follows:

Oxford county—Agricultural Representative, G. R. Green, Woodstock; Burns McCorquodale, Embro, 769; Max Butcher, Embro, 744; John Blair, Embro, 710; Carleton county Agricultural Representative, W. D. Jackson, Carp; Echlin Croskery, Kinburn, 766; Lloyd Armstrong, Kinburn, 622; E. Armstrong, Kinburn 560.

DRAINAGE SHORT COURSE AT CHATHAM

EIGHTY per cent of the ditching machines in Ontario are owned in Essex, Kent and Lambton counties and it is upon the ditching machine that we must largely rely to get our under-drainage done. Realizing this and the fact that the

benefits from drainage are realized more in Western Ontario than in other parts of the province a drainage class was held at Chatham in February to give those living in easy access to the city an opportunity to take advantage of the instruction given.

In all, twenty-five men formed the class. F. L. Ferguson and M. F. Cook of the Drainage Department, Ontario Agricultural College, Guelph, gave instructions in map surveying and soil management while a representative of the Traction Ditcher Company dealt with machine operation, care and troubles.

One of the interesting features of the class was the possibility of quali-

fying for an operator's certificate. The Department of Agriculture of Ontario is for the first time issuing certificates to competent machine operators. These are granted to those who satisfactorily answer the examination paper and show by their work in the field that they can put in a system of tile that will stand inspection.

SASKATCHEWAN

NEW STALLION LICENSES

BY W. A. MACLEOD, EDITOR OF PUBLICATIONS

SOME important changes in the first and second class certificates issued by the stallion licensing board were recently made. In future special first class certificates to be known as "A.A." and special second class certificates to be known as "B.B." will be issued. The "A.A." certificate will be granted to stallions whose value as sires is demonstrated through their breeding record and type progeny; consequently the number will be limited to a few of outstanding merit and will in no case be given to any animal

under five or six years of age. The new "B.B." special second class certificate will state that the stallion has been examined and found to be of good conformation, free from all hereditary unsoundness, but being below the standard required for "A." certificate is granted this special second class certificate. The "B." second class certificate merely certifies that the stallion has been inspected and found to be free from hereditary unsoundness. These classes are all for pure bred stallions.

SHEEP RAISING ON THE INCREASE

BY J. G. ROBERTSON, LIVE STOCK COMMISSIONER

OUR sheep population is slowly and steadily increasing. In 1919 the total head of sheep in this province was 146,911, an increase of over 12,000 over the previous year, but Saskatchewan has not yet one-tenth as many sheep as she should have.

Until the past four or five years sheep breeding was confined almost entirely to the southwestern portion of the province where large ranches were maintained. There has been a very marked increase in the numbers of sheep being kept in small flocks upon farms. A striking proof of how

beneficial this increase in the number of farm flocks has been to the pure bred sheep business was shown at the sheep sales last fall when large numbers of pure bred rams were sold at very satisfactory prices to farmers who desired to secure flock headers for their small flocks. If present prices continue there is bound to be a strong and steady demand for high-class pure bred animals for many years to come.

FACTORS RETARDING SHEEP RAISING

The factors which have retarded the increase of sheep in this province

were, unsatisfactory market prices, cost of wire fencing, and losses from coyotes and sheep-killing dogs.

The first of these factors has been remedied. The co-operative marketing of wool through the Co-operative Branch of the Department of Agriculture has insured the sheep raiser that he will get the utmost prices possible for his wool. Very satisfactory prices have been received by farmers who market their wool through this Branch.

The cost of wire fencing still remains a serious factor in retarding the development of the sheep industry in Saskatchewan but farmers are being convinced that it pays to invest in woven wire fences, not only for the growing of sheep but to prevent weeds from other peoples farms blowing over and infesting their fields.

Coyotes have seriously injured many flocks in the past and still do so to a considerable extent. The price of coyote skins is now extremely high. The provincial government up to last year offered a bounty for the destruction of coyotes. However it was found in certain sections that parties would allow coyotes to become full grown and produce litters before they would destroy them, as by so doing they would secure a good skin which would sell for a high price in addition to the bounty. To remedy this condition, the regulations were changed so that the bounty paid is only on coyote pups, trusting that it would have some effect in encouraging the destruction of pups instead of allowing them to become full grown.

There is quite a number of useless dogs throughout the province, some of which turn into sheep killers, and it might be possible for some further action to be taken to discourage the keeping of such dogs, but the matter

will have to be handled with considerable care so as not to inflict hardship in cases where dogs are useful.

ASSISTANCE FROM THE LIVE STOCK BRANCH

The Live Stock Branch of the provincial Department of Agriculture has been very active in assisting farmers in making a start in sheep raising and in encouraging the formation of farm flocks under the Live Stock Purchase and Sale Act. There has been a steady increase in the number distributed every year. In 1914 there were distributed 482 grade ewes and 13 pure bred rams; in 1915, 2,120 ewes and 35 pure bred rams; in 1916, 582 grade ewes and 10 pure bred rams; in 1917 2,968 grade ewes and 33 pure bred rams; in 1918, 3,976 grade ewes and 127 pure bred rams. For 1919 the total for the first eight months is over 3,100 ewes. The number of pure bred rams handled in the eight months of 1919 is 92. The reason of the extremely high numbers we handled in 1918 was that no sheep sale was held that year, so that the 92 handled in 1919 constitutes a record considering that very successful sales were also held.

In 1918 the Live Stock Branch imported from the United States a number of pure bred Rambouillet ewes and thirty-four pure bred Rambouillet rams, and sold them to ranchers of the province to assist them in securing new blood for their wool producing flocks. This year the Branch, working in conjunction with the Sheep Breeders' Association, made an importation of pure bred rams and ewes for the improvement of the farm flocks. These sheep consisted of both imported and eastern-bred Shropshires, Oxfords, Leicesters, two Suffolk rams, and one Hampshire ram.

ALBERTA

THE CO-OPERATIVE MARKETING OF EGGS

THROUGH the co-operation of the Poultry Division of the Dominion Department of Agriculture, and the provincial poultry branch, an egg marketing service was established in Alberta some three years ago, through which the farmers of the province could sell their eggs on a quality basis, and get cash for their products. The object in view was to stimulate the poultry industry in the province by eliminating the many disadvantages of marketing eggs through the country stores and to insure the farmers the highest price possible for their eggs. Since its inception approximately 135,000 dozen eggs per year have been sold for farmers in Alberta through this marketing service.

This work has been organized on the same plan that has developed the egg business to a very great extent in Prince Edward Island. Its success is based purely on good organization and the principle of selling the eggs according to quality. The eggs supplied by the farmers are candled and classified according to the Canadian standard for eggs, viz., specials, extras, No. 1's, No. 2's. There is usually a spread of about four cents between each grade. The result has been a decided improvement in the quality of eggs offered for sale. The farmers of the province that have taken advantage of the services are taking a keener interest in their poultry and many have doubled the number kept since the egg marketing service has started in their community.

PRINCIPAL FOR CLARESHOLM SCHOOL OF AGRICULTURE APPOINTED

MR. J. C. HOOPER, M.A., who has been in the employ of the Department of Agriculture as science teacher at the Claresholm School of Agriculture, for the past six years, has been appointed principal of this school. Mr. Hooper is a Master of Arts from Queens University. He lectured in biology in the Manitoba Agricultural College from 1909 to 1913. In the

latter year he came to Alberta. He has discharged his duties acceptably. He is an enthusiastic student in his department and has the personal qualities necessary to the easy management of a public institution.

Mr. W. J. Stephen, whose place Mr. Hooper is taking, resigned recently to take up work with the United Grain Growers' Company.

IMPORTED CLYDESDALE FOR ALBERTA

THE Honourable Duncan Marshall, Minister of Agriculture, has announced to the legislature that an outstanding Clydesdale stallion has been purchased in the Old Country for improving the horse stock of this province. At last year's

session of the legislature the expenditure for a first class Percheron and a first class Clyde was authorized, but at that time Clydes were difficult to secure and to import.

The horse is Craigie Masterpiece. He is six years old, weighs twenty-one

hundred pounds and is a proved sire. He is bred from Everlasting, a horse that was three times champion in the Highland Society Show and his dam, a mare that stood in first place at the Highland Society Show, was sired

by Revelanta. The horse is said to be a fine combination of quality and nice conformation with the right size and thickness and he should do a good deal to improve the stock of the province. He cost 2,500 pounds sterling.

BRITISH COLUMBIA

APPOINTMENTS IN THE COLLEGE OF AGRICULTURE

THREE men have recently been appointed in the Animal Husbandry branch of the University of British Columbia. These are H. R. Hare, B.S.A., formerly agricultural representative in Halton county, Ontario; Mr. J. D. French

a graduate of the Massachusetts Agricultural College, and Mr. E. C. Stillwell, B.S.A., who has been employed by the Swift Canadian Company since graduating from the Ontario Agricultural College.

RECENT APPOINTMENTS

MR. CECIL TICE has been appointed Soil and Crop Instructor in the Live Stock Branch of the Department of Agriculture, Victoria, B.C., from March 24, 1920. Mr. Tice was born in Surrey, England, in the year 1893, and received his education at the famous Blue-coat Boys' School. Having a strong inclination for farming he came to Canada in the year 1910 and was engaged in mixed farming for

several years in the Province of Ontario. Entering the Ontario Agricultural College he obtained his B.S.A. degree in the year 1919. While a student at the college he spent two summers on experimental farm work under Dr. C. A. Zavitz, and subsequently was a Potato Disease Inspector for two seasons under the Dominion Department of Agriculture in Northern Ontario.

AGRICULTURIST AND FIELD INSPECTOR

MR. CHARLES TWIGG was appointed District Agriculturist and Field Inspector for Creston in the West Kootenay district of B.C. on the first of December, 1919. He was born and raised in the North of Ireland. He emigrated to Canada in the spring of 1899, and was employed in the Slocan district in a land surveyor's office. He then went East and graduated with class '07 of the Ontario Agricultural College. After doing some work in the spring of 1908 for the Horticultural Department at Victoria through the Slocan Valley, he went to the United States and was appointed Horticultural Inspector in the State of Illinois, which,

after nearly two years, he resigned for a similar position in Kansas, where he stayed for a year or so. After resigning his position in Kansas he went farming with his brother in the North Okanagan near Enderby for four years until the second year of the war when he enlisted in the C.A.M.C. at Vernon and saw service for nearly two years in France as a re-enforcement to the 6th Field Ambulance, part of the Second Division. After the Armistice he was employed as a Horticultural Instructor in the Khaki College, being stationed at Sunningdale, Berk, England, for several months, returning from Overseas the end of August, 1919.

PART III

Junior Agriculture

DEMONSTRATIONS, COMPETITIONS, AND CLASS-ROOM STUDIES IN RURAL LIFE FOR BOYS AND GIRLS

BANKS AND BOYS' AND GIRLS' CLUBS

IN recent years there has developed a strong tendency on the part of banking institutions, in Canada and the United States, in co-operation with federal and provincial or State Departments of Agriculture to give financial aid to boys' and girls' live stock club work. Readers of *The Agricultural Gazette* are already familiar with the work these clubs are doing and the policies under which they operate. But in order to clearly present the activities of the banks the statements of the general managers, or their representatives, of these institutions have been secured. The information presented in the following paragraphs is compiled from the communications received from nearly a score of banks who are taking an active part in encouraging the live stock industry among the rural boys and girls.

CANADIAN BANKERS' ASSOCIATION

As pointed out in Part I of this issue the Canadian Bankers' Association co-operates with the federal Department of Agriculture and each contributes prize money on an equal basis. The rules and regulations which govern the competitions under this association are standardized for the whole Dominion and they have been drawn up with a view to promoting the best interests of the agricultural industry. At the same time the educational side has not been overlooked.

LOANS TO BOYS AND GIRLS

It is the policy of these banks to actively support (within the principles of sound banking) the formation of boys' and girls' live stock and poultry clubs in the rural districts served by the various branches. This work is done in conjunction and with the advice of the local representative of the provincial department of agriculture. As a general rule the money is advanced to minors at six per cent on notes signed by their parents or guardians for the purchase of pure bred stock. These loans are made on the local manager's knowledge of the promisor. Assistance is also given through the advertising of the banks who signify their willingness to make these loans.

From all reports received it is evident that the banks are in full sympathy with every movement to encourage the interest which the boys and girls are taking in the raising of live stock. In very few instances a special man directs this work but the importance of stimulating a friendly competition among the young people in every neighbourhood in developing this industry has been impressed on the local managers at country points.

In most cases the live stock clubs financed by these banks are conducted under the supervision of the agricultural representative but there are instances where the enthusiastic local manager of the bank has per-

sonally conducted a successful pig club of a similar nature. It may be stated that now the great majority of country branches of our leading banks have been authorized to make loans to minors for the purchase of animals, and with the experience of the past two years there will be a large demand for advances in 1920. The banks are in sympathy with the movement and the boys and girls have seen the results of the experiments of others and feel assured of success in the venture.

ENCOURAGING THE YOUTH

It has been frequently pointed out that one of the chief factors in causing farmers' sons and daughters to leave the farm and go to the city is the farmers' practice of absorbing the earnings of their children into the parental purse even after they have come of age. To meet this situation and to afford the children training in business and thrift the banks in making unindorsed loans to minors have stipulated with the parents that any profits resulting from the transaction in connection with which the money was loaned should remain the property of the boy or girl.

In the opinion of the bank officials there is no other movement connected with agriculture which gives promise

of such far reaching results in the development of agricultural efficiency as that of the boys' and girls' clubs. The schemes put forth have been calculated to arouse the interest of the younger members of the community and it is to this end that efforts and funds have been contributed liberally.

The banks realize that the stimulation they are giving to agriculture is not temporary but is a preparation for bigger future business. It is on the boys and girls who are doing club work now that they depend for large returns in the future. They know that what the young folks in the country need is a start, and realize that the boys and girls will do the rest.

SPECIAL PRIZES AWARDED

Arrangements are made through the managers of local banks at many points whereby special prizes are donated for special contests at the local fairs. These together with the donations from the Canadian Bankers' Association have lent added interest at school and other fairs where competitions are held. Through this activity many children have come to learn of the function and value of banks who otherwise would have grown to manhood or womanhood practically ignorant of the activities of these institutions.

NEW BRUNSWICK

HATCHING EGGS FOR POULTRY CLUBS

THE Elementary Agricultural Education Division is prepared to send to boys' and girls' poultry clubs, that have been formed in the province, settings of eggs for hatching. Eggs of the Barred Plymouth Rock breed, for the most part, will be supplied in response to applications made on

regular enrolment cards issued by the Division. The Division is opposed to the mixing of breeds on the same farm, but will endeavour to secure hatching eggs of Wyandottes, Rhode Island Reds and Leghorns if these are chosen by members of clubs that have specialized with these breeds.

SHORT COURSES IN HOUSEHOLD SCIENCE

THE short course in household science conducted by the women's institutes division of the Department of Agriculture for the benefit of the women and girls throughout the province began early in March. Each day, for ten days, classes are held in cookery, millinery, and nursing. The staff, which includes Miss E. Nutter, H.Sc., Miss A. Love, and Miss A. Landry, R.N., will be under the supervision of Miss Hazel McCain. The classes will be

held at Sussex, Moncton, Devon, Perth, Chatham, Bathurst and St. Stephen, N.B. The opening class at Sussex began March 2, while at St. Stephen the closing day is June 4.

Written examinations will be held in each subject and credit marks will also be given on practice work done during the course. Prizes will be awarded in each department for the highest total of credit marks in practice and written tests.

ONTARIO

SPECIAL COUNTY COMPETITIONS

FOR several years competitions between boys in the growing of potatoes have been carried on in the counties of Carleton and Russell, Ontario. The work was commenced and supported by the late R. B. Whyte, who at his death provided funds for its continuance. A corresponding contest in gardening and fruit canning for girls has been conducted in Carleton county. The work is carried out by Mr. L. H. Newman, Secretary of the Canadian Seed Growers' Association, in co-operation with county agricultural representatives.

From the funds provided by the late R. B. Whyte cash prizes, as well as books, were provided for the competitors. In each county the boys were granted six prizes ranging from \$15 to \$4. In the gardening and canning contest \$100 was divided amongst the competing girls according to the points won. The prizes are awarded at a public meeting held in the city of Ottawa at the end of the season. At this meeting the competitors and their friends are addressed by prominent agricultural officials.

BOYS' POTATO GROWING CONTEST

In the potato growing contest the area was one-tenth of an acre. The competition included cultural practices, crops harvested, exhibits at the county fair, and essays describing the work. In Carleton county seven, and in Russell county eight boys completed the contest last year. The plots were inspected by government officials for disease and reported upon for the benefit of the boys who were expected, among other things, to spray during the season as occasion demanded. In Carleton county as high as 415 bushels per acre were obtained, which gave a net profit at the rate of \$70.20 per acre. The average profit made by the competitors in this county was \$54.20. In Russell county the first prize winner made a profit of \$107 per acre, while the average was \$20.66. The average for the two counties was \$37.43. These figures are based on the price of sixty cents per bushel agreed upon when the work was organized seven years ago.

THE GARDENING AND CANNING
COMPETITION

In 1919 twenty-three girls entered the gardening and canning competition, while fifteen fulfilled the requirements of the contest throughout the

whole season. The awards were based on combined scores awarded on work performed in the garden, on the exhibit sent to the county fair, and on an essay describing the season's work. The area gardened was one-twentieth of an acre

KENT COUNTY PIG CLUBS

BY J. L. DOUGHERTY, B.S.A., AGRICULTURAL REPRESENTATIVE

THE boys and girls of Kent county will have the opportunity of securing the foundation of a good herd of swine by becoming members of one of the pig clubs which are being formed under the direction of the Kent county branch of the Department of Agriculture co-operating with the Merchants Bank of Canada at Chatham, Ont. These clubs are being formed with the idea of encouraging young people on the farms to take a greater interest in good live stock. The objects of the club are, to create a greater interest in hog raising in Kent county which is so well adapted to this industry; to introduce into the country a number of pure bred pigs at cost and on easy terms of payment; to give to members of the clubs the latest information on feeding, marketing, and breeding hogs, and to have them secure definite information on the cost of pork production.

Membership in each club is open to boys and girls between the ages of ten and eighteen years (inclusive) who will agree to the rules and regulations of the club. Each member

will receive two pigs about two months old, one registered and the other a grade, and a note endorsed to the satisfaction of the manager of the bank must be signed by the member, covering the cost of the two pigs which will range between \$26 and \$28. A pure bred gilt costs \$20 and it is expected that the grade will cost from \$6 to \$8, both will be sold to breeders at cost. The notes are payable December 1 at 7% interest. The parents are asked to assist the children by furnishing a suitable pen and yard and supplying sufficient, suitable feed and one quarter acre for pasture. Each member must care for the pigs in person. Forms will be supplied to record the amount and kind of feed fed and the weight of each pig at the end of each month. It is expected that the pigs, which will be selected from well bred stock by competent men, will be distributed from Chatham about the end of May. The pure bred animals will be registered in the names of members.

The junior farmers of Kent Bridge being the first to organize a pig club are entitled to the \$50 prize offered.

BRUCE COUNTY SHORTHORN CALF CLUB

BY N. C. MACKAY, B.S.A., AGRICULTURAL REPRESENTATIVE

ONE of the first Shorthorn calf clubs in Ontario is being organized under the direction of the North Bruce Breeders' Club co-operating with the Bank of Hamilton, Port Elgin, and the Merchants Bank, Paisley, Ont. Pure bred Shorthorn heifers from eight to thirteen

months of age will be furnished to the members of the club who are boys and young men from fourteen to twenty-two years of age, and their notes bearing interest at 6% will be accepted for a period of eight months. At the time the note falls due the owner may pay for his calf or he may

sell it and redeem the note. A show will be held during the fall at which each of the calves will be shown and good prizes will be awarded.

The heifers are being selected by a committee of the Shorthorn breeders' club, co-operating with the agricultural representative, and only good individuals of Scottish breeding will be selected. The calves will be distributed from Paisley and Port Elgin early in April and will be allotted by drawing lots.

The main objects of the club are to create a deeper interest in pure bred live stock; to provide a good lot of Shorthorn heifers with the hope that they will be used as foundation stock for splendid herds of Shorthorns; to interest boys and young men in the feeding and breeding of cattle, and to encourage the proper care of stock and best methods of feeding.

MANITOBA

SCHOOL GARDENS AND HOME GARDENS

BY W. C. HARTLEY, I.P.S. CARMAN, MAN.

INTEREST began to centre about school gardens in Manitoba about ten years ago, and as a result, within five years about seventy-five per cent of our schools in the older portions of the province were quite active in this work. But during the past two or three years the school gardens have not been so conspicuous, not that the interest has died, or even weakened, but because it has widened into a broader and more vital activity in the agricultural education of our boys and girls: viz., the home garden.

In most of our schools, in my division at any rate, a very large percentage of the boys and girls, between the ages of ten and sixteen, are deeply interested in the raising of garden and field products. This activity unites the interests of the home and school, and combines with the training and supervision of the school, the interest and often expert assistance of parents in the home.

From these gardens magnificent exhibits of vegetables, grains and canned products, flowers, and small fruits, are shown at our fall boys' and girls' club fairs, and the growing of seed grain, hand picked and selected is attempted. Some thirteen of these fairs

were held last year in my inspectorial division, and two hundred and twenty in the province. Each of these fairs comprises the work of from three to fifteen individual schools.

Many difficulties are encountered in the scarcity of competent instructors, but more serious is the lack of real love for working with the soil. But these are largely being met by the co-operation of the parents with the school teachers. The home experience joined with the theoretical work of the school make an admirable team, only equalled by the union of the teacher's ethical, with the parents' practical estimate of the value of the work.

The chief values, already partly realized, are various, the chief of which being the natural love and attachment that is developing in our young citizens for things rural, pertaining to the soil; their fondness for producing; and their joy of acquiring through their own effort. Contiguous with this effect is that of co-operative interest. Each is interested in the effort of the other, till a common bond of associated interest links them as a group to nature's assets, gradually revivifying a rural social consciousness. The cultural value of living close to nature, and

allying oneself with her spirit cannot be overestimated. Last but not least, we are acquiring new ways of applying old rules, in our mathematics, science, art, etc. So that, the schoolroom is acquiring a new fascination.

Many of our schools still retain the school garden, where mainly experiments of interest to the community are carried out, but its drawbacks are recognized. The long summer vacation, often allows the weeds to gain an ascendancy, and few people live near enough to the garden to care for it during this period. Drought, winds, frost and

hail often dampen the ardour of the young enthusiasts.

But a few lessons have been fairly implanted regarding gardening. The necessity of a proper seed bed, continuous cultivation to retain the moisture, prevention and destruction of weeds, wise and plenteous thinning, and proper harvesting and storing of the product.

If we continue courageously along our present lines, the increasing fondness, the growing knowledge, and the developing community consciousness will go far to solve the problem of rented and vacant farms.

CALF COMPETITION RESULTS

TWENTY-FOUR prizes amounting to \$1,350 and grading from \$150 down to \$10 were awarded to boys who showed steers and heifers in the competition open to them at the Manitoba Winter Fair and Fat Stock Show held in Brandon early in March. The first prize calf and grand champion of the show, sold for fifty cents per pound and weighed 1,050 pounds. This steer had earned for his young owner, Glen Campbell, aged nine, of Chater, over two hundred dollars in prize money. The second prize calf weighed 910 pounds and sold for one dollar and thirty-one cents per pound. The owner was Richard Hamilton, aged nine, of Brandon.

There were seventy-four calves in the Boys' Calf Feeding Competition and besides the twenty-four regular prizes the owners of the calves were each given \$15 consolation money.

CONTINUATION CLASSES

The boys' continuation class was open to those who had entries in the boys' fat calf competition in any of the past five years for steers calved in 1918. The prizes on this competition ranged from \$50 to \$5 divided into twelve prizes totalling \$255. In addition to the money prizes, the Manitoba Agricultural College gives to the winners of first, second and third places one year's free tuition at that institution.

SASKATCHEWAN

SHORT COURSES IN HOUSEHOLD SCIENCE

A SUCCESSFUL four day course in household science, including lectures on dairying and poultry raising, was held at Swift Current by the University of Saskatchewan co-operating with the Soldier Settlement Board of Regina. This course was planned for the soldiers' wives from the surrounding districts and was carried out by a staff consisting of four lecturers from the

Saskatchewan University and provincial Department of Education under the supervision of Miss DeLury. The entire course was made to deal directly with the every-day problems of the home, and keen interest and appreciation were shown by the women in attendance. Similar courses are being planned for Moosejaw, Regina and Yorkton, Sask.

PART IV

Special Contributions, Report of Agricultural Organizations, Publications, and Notes

ASSOCIATIONS AND SOCIETIES

EVENTS OF THE MONTH

April 1, Third Annual Pure Bred Horse Sale at the Stock pavilion, Exhibition Grounds, Edmonton, Alta., under the control of a committee of managers appointed by the provincial Department of Agriculture, the Edmonton Exhibition Association and the Alberta Horse Breeders' Association. Secretary, W. J. Stark, Box 216, Edmonton, Alta.

8-9, Canadian National Annual Sale of Holsteins at Union Stock Yards, West Toronto. President, Gordon S. Gooderham, West Toronto.

May 1. Entries close for annual sale of pure bred cattle to be held at Saskatoon

on May 26 and 27; secretary, J. G. Robertson, Regina, Sask.

26-27. Annual sale of pure bred cattle at exhibition grounds Saskatoon, Sask.; secretary, J. G. Robertson, Regina, Sask.

26-27. Eleventh annual auction sale and show of pure bred bulls held by the Alberta Cattle Breeders' Association under the auspices of the Alberta Department of Agriculture, at Lacombe, Alta; secretary, E. L. Richardson, Calgary.

COUNTRY AND CITY BROUGHT TOGETHER

Through the co-operation of the boards of trade and chambers of commerce with farmers' clubs and other county associations, better understanding between rural and urban people is being secured. At Hamilton, London, Stratford and other points in Ontario, but more especially at points in western Canada, farmers and industrial leaders are becoming better acquainted with each other's needs. The Board of Commerce and Agriculture having a wider constituency is also opening the way for unifying production and commercial enterprises. In the eastern states of the American Republic, a better understanding and co-operation between city and country is being reached through what is termed The Eastern States Movement. Less than seven years ago the

fundamental idea of city and country getting together, of manufacturer, banker, farmer and merchant joining hands to bring about more successful agriculture, began to crystallize in the form of county organizations known as improvement leagues and farm bureaus. The movement started in 1912 in Bennington county, Vermont, and Hampden county, Massachusetts, soon followed; then other counties throughout New England.

Here farmers and other business men organized to co-operate with the United States Government, the State Agricultural Colleges, Departments of Agriculture and other agricultural agencies to employ specialists to co-operate with the farmers, by introducing modern methods and helping to

create better marketing facilities. The idea of the city and country interests uniting in these county organizations in New England spread rapidly to other North Atlantic states.

As these New England organizations brought practical results, and as they began to face the problem of more economic production and distribution of farm products, the industrial and agricultural leaders began to realize that there was work to be done, supplementing what the government, state, and county agencies could accomplish. It was realized that all New England had common problems and should have a common programme, that to make agriculture prosperous the state boundaries should be eliminated and all efforts united in the common cause.

Furthermore, it was felt that there was considerable supplemental and reinforcing work to be done in connection with the educational programme that was being carried on through the federal, state and county agencies.

The first movement was an effort to stimulate dairy and live stock interests. This movement led to the organization of the National Dairy Show, which is proving to be a great people's university.

In addition to the exposition itself, it has organized the Eastern States Agricultural and Industrial League, which has the following bureaus: market bureau, farm finance bureau, boys' and girls' bureau, farm development bureau, publicity bureau, and home bureau.

The Eastern States Agricultural and Industrial League through its market bureau has organized the Eastern States Farmers'

Exchange, which during the first year of its existence will have purchased co-operatively for farmers over \$1,000,000 worth of feed, grain, fertilizer, seed, etc., effecting large savings on these wholesale purchases.

The Market Bureau is also organized for standardization and marketing of farm crops. A beginning has been made in the marketing of potatoes, which project has been underwritten by the New England Farm and Food Foundation. The aim is to bring producer and consumer more closely together, eliminating many unnecessary steps between.

The farmer needs credit. The Eastern States Farm Finance Bureau has already stimulated banks to employ experts to assist farmers in securing loans.

The Boys' and Girls' Bureau has brought the champions of the ten North Atlantic States together annually as guests of the exposition, for a week of instruction, contest, inspiration—thus reinforcing the work that the federal, state and county agencies are conducting.

By means of a well directed staff, the Eastern States Movement, which is assisting the organization of the farmers and the consumers, will aim to reinforce all existing agencies, and is securing their hearty co-operation. It is by this getting together of city and country that a great endeavour will be made to encourage demand for, and consumption of, home grown and home manufactured products.

In support of The Eastern States Movement an organ called The Eastern States Magazine, which began in September last year, is issued monthly.

THE NATIONAL DAIRY COUNCIL

Mr. D'Arcy Scott, Secretary and General Counsel of the National Dairy Council of Canada reports that as a result of the Evidence of the Council before the Railway Commission an increased rate for the carriage

of milk in baggage cars proposed by the railway companies has been refused. This decision by the Railway Commission confirms the old rates of transportation as they existed prior to the first of May, 1919.

THE ROYAL WINTER FAIR

The first annual meeting of the Royal Agricultural Winter Fair Association was held in Toronto on February 19. By-laws governing the association were adopted and a board of directors elected. The directorate includes the mayor of Toronto, the federal and Ontario Ministers of Agriculture, the vice-chairman of the Board of Control of Toronto, the managing director of the association, and the various allied associations according to the following representation: horse breeders' associations, four; beef cattle

breeders' associations, three; dairy cattle breeders' associations, three; dairymen's associations, three; swine breeders' associations, three; sheep breeders' associations, three; poultry breeders' associations, three; fruit and vegetable growers' associations, three; horticultural associations, three; women's associations, two; seed associations, three; bee keepers' associations, one; the financial subscribers of the association, four; abattoirs and stock yards, one; Mr. C. F. Bailey is the managing director.

NOVA SCOTIA DAIRYMEN'S ASSOCIATION

Among the resolutions passed at the Nova Scotia Dairymen's convention were the following:—That the association strongly recommend a uniform system of cream grading with a premium for first grade; that the provincial Department of Agriculture be urged to carry on a farm survey in different districts throughout the province with an idea of determining the cost of production

of farm products; that a change in the system of selecting the butter for the summer scoring competition be made; that the inspector of creameries, or any one duly appointed by him, be authorized to go into cold storage of all competing creameries and select any fifty-six pound box each month for five months, and have it closed up and shipped to the proper storage place.

NOVA SCOTIA POULTRY ASSOCIATION

A resolution was passed to the effect that in future the poultry entered and exhibited in the poultry show in Nova Scotia must, in every case, be owned and in the possession of the person exhibiting them for a period of thirty days before the opening of every poultry show. It was resolved that this regulation must be incorporated into the rules of every poultry club prize list which

receives any aid from the Department of Agriculture in the province of Nova Scotia. Failure to enforce this regulation being sufficient reason to withhold the grant.

The officers elected are: President, H. H. Howe, Glace Bay, N.S.; vice-president, E. C. Griffin, Port Williams, N.S.; secretary-treasurer, J. P. Landry, Truro, N.S.

UNITED BOARDS OF TRADE AND FARMERS' CLUBS CO-OPERATE

BY R. A. FINN, B.S.A., AGRICULTURAL REPRESENTATIVE, LONDON, ONT.

More than two hundred representatives of farmers' clubs joined with the United Boards of Trade of western Ontario in the deliberations of their second annual meeting in London held in February. Discussions of problems common to rural and urban dwellers featured the entire convention and, as a result, further co-operation has been planned by the boards of trade and the farmers' clubs of the district. To accomplish this each board of trade in western Ontario will unite with the farmers' clubs in its vicinity to solve problems of local interest while the Western Ontario Board of Trade will work with the clubs to solve the problems of the whole district. Bruce, Huron, Lambton, Essex, Kent, Elgin, Norfolk, Oxford, Middlesex, Perth Waterloo, Wellington, and Brant counties were represented by rural and urban delegates at the convention, and a follow up conference has been arranged.

At the conclusion of the discussions in which a number of prominent men took part the following resolution was unanimously adopted:—

"Resolved that the western Ontario united boards of trade, farmers' clubs, and municipal councils in conference assembled, desire to call attention of the provincial government to the seriousness of the present labour scarcity in rural Ontario, to the necessity of taking immediate steps to procure additional desirable immigration, to the importance of proper instruction and supervision for immigrants settling on Ontario farms, and to the need of modifying our school system that rural education may be properly emphasized and made accessible to boys and girls who desire to identify themselves with rural industry."

INTERPROVINCIAL DAIRY CONVENTION AND SHOW AT WINNIPEG

BY L. A. GIBSON, DAIRY COMMISSIONER FOR MANITOBA

Much has been accomplished by Manitoba, Saskatchewan, and Alberta during the past three years through organization and co-operation in developing general dairying and particularly the creamery butter industry. Previous to 1918 each province was a separate dairy unit working to different butter standards. To-day the interprovincial spirit is strongly developed and instead of there being Manitoba, Saskatchewan, and Alberta creamery butter, all of different types, there is Western Canada Creamery Butter of one type made in the three provinces.

This result has been largely secured through the development of the Interprovincial Dairy Convention started in January, 1918, and held annually at Winnipeg since then. The last convention, held during the third week in February, 1920, was the most representative and successful of all, being coupled with the annual meeting of the National Dairy Council of Canada and every other dairy event of importance in the west, including the second Western Canada Dairy Show. The creamery butter exhibits attracted not only the makers but also produce men and brokers.

The buttermakers competitions, inaugurated three years ago for the purpose of standardizing the butter of the Prairie Provinces provides for a separate competition to be carried on simultaneously in the three provinces extending over a period of six months. The three makers in each province having the highest average score for the period then enter the interprovincial competition and prizes are awarded to the competitors in order of merit. The prizes are liberal and the entries from each province have been

indicates a very close competition. The highest interprovincial award was secured by Saskatchewan with a score of 97.05.

A number of innovations were introduced into the show. A herd of cows with their records of performance was among the attractions. In addition to the herd of pure-breds, from the Manitoba Agricultural College, there was this year set beside them a number of ordinary or scrub cows to emphasize the effect of proper dairy breeding. Up to the present the dairy show has been



THERE WERE 225 INDIVIDUAL EXHIBITS AT THE MANITOBA DAIRY ASSOCIATION CREAMERY BUTTER EXHIBIT HELD IN WINNIPEG, JANUARY, 1920

numerous. This year there was the added attraction of an "All Canada" competition which brought entries from every province in Canada and, combined with the other classes, gave the Winnipeg conference the largest exhibit of creamery butter ever shown in Canada. In the "All Canada" competition the first, second, and third prizes were won by Alberta, the fourth and fifth by Quebec, and the sixth by Manitoba. The score for the first prize was 98 and for the sixth 97.4 or a difference of six-tenths of a point between the first and sixth which

conducted under the auspices of the Manitoba Dairy Show who took over the project and developed it. Much larger show buildings must be obtained and plans are already under way to secure the erection of these.

The men behind the dairy business in the western provinces are definitely aiming for an annual output of 100,000,000 pounds of creamery butter in the three provinces where 25,000,000 pounds are made to-day. They are facing the question broadly and are disregarding the imaginary boundary lines in their effort to lay the foundation of a great dairy industry for western Canada.

THE MANITOBA HORTICULTURAL AND FORESTRY ASSOCIATION

The twenty-third annual convention of the Manitoba Horticultural and Forestry Association was held in Winnipeg during the last week in February. The several sessions held covered fruit growing, market gardening, potato growing, flowers, and forestry.

Four types of potatoes were adopted by the association as suitable for Manitoba growers, namely: Early Ohio, Beauty of Hebron, Irish Cobbler and Green Mountain. The establishment of fixed commercial grades, the use of the one hundred pound sacks for graded potatoes, the importation of certified "disease free" seed for general distribution, and the holding of commercial exhibits of potatoes for the purpose of stimulating the interest were recommended and resolutions to this effect were passed. The following potato score card was submitted and adopted:—

Quality	30
Uniformity	20
Trueness in type	15
Freedom from disease	20
Smoothness and shallowness of eye	15
Total	100

THE UNITED FARM WOMEN OF MANITOBA

The United Farm Women of Manitoba have appointed committees to take care of the work being done by the organization throughout the province. Seven committees are appointed to deal with public health, immigration, social service, marketing, property laws, community work, and young people. Leaflets for the guidance of local sections of the organization cover the subjects of parliamentary procedure, what a women's section can do, and suggestions for securing and maintaining interest in the local. Booklets on debating; your baby, how to keep it well;

Among the resolutions carried at the forestry session were the following; that the executive make public all obtainable information relative to the possibility of utilizing for fence post purposes all trees capable of practical production in Manitoba; that the Manitoba Department of Agriculture be asked to offer cash rewards to individuals who will originate new and improved varieties of plums suitable for Manitoba conditions, and that a special committee be appointed to draft the proposed conditions and the executive be charged with the responsibility of this request after approval by the Department of Agriculture.

The officers elected for the ensuing year are:—president, H. W. Watson, 205 Walnut St., Winnipeg; vice-presidents, W. J. Harrison, R. R. No. 4, Winnipeg; and F. L. Skinner, Dropmore, Man.; secretary-treasurer, Professor F. W. Brodrick, Agricultural College, Winnipeg.

the legal status of women in Manitoba, and Canadian girls in training have also been prepared. The last two are issued at twenty-five cents and ten cents respectively. The Extension Service of the organization has made arrangements with the provincial Department of Agriculture to use the travelling libraries. These are obtainable for a period of three months for a fee of \$2.00. These libraries are in charge of Mr. S. T. Newton, Director of Agricultural Extension Service, Department of Agriculture, Winnipeg.

SASKATCHEWAN LIVE STOCK CONVENTION

The Saskatchewan Live Stock Convention and annual meeting of the Saskatchewan live stock associations was held at Regina during the first week in February. A number of resolutions passed by the various associations were—one urging more suitable accommodation at the Regina winter fair and a request for the erection of a sale ring which may be used for both public and private sales; one recommending assistance to exhibitors who had stock worthy of being exhibited at the international show, and one to amend three clauses in the constitution dealing with the method of electing officers and directors, and question of place of the annual meeting.

The officers for the Horse Breeders' Association for 1920 are:—president, W. H. Gibson,

Girvin; vice-president, Hugh Gilmour, Moose Jaw; secretary, J. G. Robertson, Live Stock Commissioner, Regina, Sask.

The officers elected for the Cattle Breeders' Association are:—president, James Brown, Neudorf; vice-president, P. N. Bredt, Edgewood; secretary, J. G. Robertson. The Cattle Breeders' adopted a resolution asking for a bull sale to be held in Saskatoon about June 1.

Among the resolutions passed by the Swine Breeders' was one protesting against the action of the railway commission in imposing a one and a half cent a mile rate for attendants returning after taking car loads of stock to the central markets. The officers for 1920 elected are:—president, S. V. Tomecko,

Lipton; vice-president, R. A. Wright, Drinkwater; secretary, J. G. Robertson.

The Sheep Breeders' passed a resolution regarding the importing of more pure bred sheep from England and Scotland. The association entry fee for grade ewes was reduced from 50c to 35c and a motion was passed recommending that the association shearers will be employed again next year. H. Follett of Duval was elected president

for 1920, E. E. Baynton of Big Stick Lake vice-president, and J. G. Robertson, secretary.

At a meeting of the Live Stock Associations' Board held at the close of the convention it was definitely decided to continue the fall fairs at Regina and Saskatoon for another year. The officers of this Board elected for 1920 are: hon. president, Robert Senton, Regina; president, R. W. Caswell, Saskatoon; vice-president, Olaf Olafson, Mortlach; secretary, J. G. Robertson.

SASKATCHEWAN DAIRYMEN'S ASSOCIATION

The annual meeting of the Saskatchewan Dairymen's Association was held at Moose Jaw on February 11 and 12. Resolutions were passed calling upon the provincial Department of Agriculture to supply, as far as possible, special high grade dairy heifers and cows of good quality and registered dairy sires to meet the public demand; urging upon railway companies the necessity of more

careful handling of cream and milk during transportation; recommending a continuance of monthly butter tests between buttermakers in the province, in which awards will be made on the score of the butter sent to the grading station. The following officers were elected:—president, M. F. Logan, Regina; vice-president, O. W. Anderson, Humboldt; secretary, P. E. Reed, Regina.

BRITISH COLUMBIA DAIRYMEN'S CONVENTION

At the gathering of the dairymen of the province at Vancouver, during the third week of January the following officers were elected:—president J. W. Berry; vice-president, P. H. Moore; secretary, T. A. F. Wiancko.

It was decided that three grades of cream should be recognized. First, cream testing 25% butter fat will be taken as the base and will be called first grade. It must be of mild acidity and free from undesirable flavours and will command a base price in accordance with the market. Second grade cream classed as being over ripe, strong flavoured or too low in test, will be paid for at a rate two cents below grade one. Special grade cream must test not less than 30% butter fat, be sweet or practically sweet, and will

command a price two cents above the base price. The creamery members agreed to grade all their purchases on the above system.

It was pointed out that while a few years ago a silo in British Columbia was a rarity, today there are nine hundred of them in the province. Several resolutions of importance were carried dealing with the following matters; first, that the Government continue to assist farmers by furnishing cheap powder, powder bonuses, and community land clearing; second, that the sale of tuberculin be restricted to only those persons properly authorized to use it; third, that the provinces be asked to assist in supplying dairy cattle for the newer districts which are opening up.

BRITISH COLUMBIA GOAT BREEDERS' ASSOCIATION

The membership of the British Columbia Goat Breeders' Association now totals 354. At the annual meeting of the association held in Victoria the following officers were elected: president, G. H. Cottrell, Vancouver;

vice-president, W. J. Duval, Victoria; secretary-treasurer, Geo. Pilmer, Victoria. It was pointed out at the meeting that the federal government has signified its intention of starting milk records for pure bred goats as soon as the necessary regulations are decided

BRITISH COLUMBIA POULTRY ASSOCIATION

At the annual meeting of the British Columbia Poultry Association held in Vancouver in January the officers appointed for the year were: president, A. H. Anderson of Hammond; vice-president, R. Wilson,

Vancouver; secretary J. R. Terry, Victoria. The membership to the association is increasing slowly and the executive is making every effort to secure the confidence and backing of the poultry raisers of the province.

NEW PUBLICATIONS

DOMINION

Report on the Agricultural Instruction Act, 1918-1919. This report deals with the work carried on during the year by provincial Departments of Agriculture and Education with the moneys assigned them under the above Act.

Wholesale Dealers of Fruits and Vegetables in Canada. This list, compiled by the Fruit Branch of the federal Department of Agriculture, covers the wholesale dealers in apples, other domestic fruits, potatoes and onions. The dealers, according to provinces and cities, are arranged alphabetically.

Avian Tuberculosis, Bulletin No. 18, is issued by the Health of Animals Branch of the Department of Agriculture, Ottawa. This bulletin is a thorough treatise on tuberculosis of fowls and it covers the symptoms, course, and diagnosis of the disease, states the post-mortem findings, and gives methods for prevention and treatment of disease and for disinfecting poultry houses.

QUEBEC

The Thirteenth Annual Report of the Agricultural Merit Competitions 1919, being a supplement of the report of the Minister of Agriculture for Quebec, contains the report of the judges and names of the successful competitors taking part in this agricultural movement in Quebec.

Standing Crop Competition, Bulletin No. 60, is issued by the Department of Agriculture, Quebec. This bulletin contains the twelfth annual report of the crop competition organized by the agricultural societies under the direction of the provincial Department in co-operation with the federal Department of Agriculture.

Lightning Rods, Bulletin No. 65 of the Department of Agriculture of Quebec, deals with the history and theory of protection against lightning, together with instructions for the installation of rods on rural buildings.

Hygienic Dieting, Bulletin No. 38, is published for use in domestic science schools and also in the home. It sets forth rational principles of dieting and gives the composition of the principal foods ordinarily used in this country.

ONTARIO

Several new circulars have recently been issued by the Dairy Branch of the Ontario Department of Agriculture and may be secured on application to the Department at Toronto, as follows:—

The Babcock Test for Milk and Milk Products is Circular No. 19. This circular gives

a brief history of the test, the principles involved, together with full instructions for testing milk, cream, buttermilk and whey.

Cool Sweet Milk Makes Most and Best Cheese, Circular No. 20 gives excellent suggestions which will assist the dairymen in the care of his milk. It also illustrates a tank for cooling milk and a crane for raising the cans from the tank.

Keep Cream Cool and Sweet, Circular No. 21. Its suggestions are under the following heads; care of cream, utensils, separating cream, variations in cream test, and quick and thorough cooling of cream.

Why Should the Milk of the Individual Cow be Weighed and Tested, and Records Kept of the Results. Circular No. 22 is the answer to these questions. It covers the subject briefly but completely.

Ice on the Farm, Circular No. 26 deals with the uses, harvesting, storage and preservation of ice together with information regarding quantity allowed for waste, necessary equipment, etc.

The Annual Report of the Statistics Branch 1918, issued by the Ontario Department of Agriculture, continues the reports issued by the former Bureau of Industries. Part one of this report deals with agricultural statistics and part two with chattel mortgages in the province.

Annual Report of the Corn Growers' Association 1918 is published by the Ontario Department of Agriculture. This report includes the addresses given at the annual convention held in Chatham in February, 1919, and contains other information of interest to corn growers.

MANITOBA

Report of Crops, Live Stock, etc., Crop Bulletin No. 98, issued by the Department of Agriculture and Immigration, presents statistics and information secured from over 10,000 farmers and a staff of crop correspondents in every district of the province.

The Pure Bred Poultry Industry, Extension Bulletin No. 45, by M. C. Herner, B.S.A. This bulletin is divided into two parts. The first part discusses pure bred or mongrels; eggs for hatching; baby chicks; breeding stock; exhibition stock and poultry shows. The second part contains a directory of poultry breeders as compiled by the Manitoba Poultry Breeders' Association.

ALBERTA

Winter Rations for Brood Sows. Circular No. 1. of the College of Agriculture of the University of Alberta by Professor A. A. Dowell, is a summary of the 1917-18 experiment on the feeding and management of sows.

BRITISH COLUMBIA

Two pamphlets have recently been issued by the Department of Agriculture, Victoria, B.C. *Secret of Health* by the Dairy Branch, deals with the importance of milk as a diet for the young; *Square deal for the British Columbia Children*, by the Household Science Branch, testifies further to the value of milk in the children's diet.

SASKATCHEWAN

The Fourteenth Annual Report of the Department of Agriculture of Saskatchewan covers the twelve months ended April 30, 1919. In this fourteenth annual report is a brief review of the year's agriculture and full reports from the various branches of the Department of Agriculture throughout the province.

MISCELLANEOUS

Forests and Trees by W. J. Hales, B.A., L.L.B., Principal, Normal School, Brandon, Man., is written to assist in impressing upon the young the value of our forests and to show them what is being done and what must be done to preserve them. The information it contains tends to create a healthy public opinion regarding the use and care of trees.

The Catalogue of Registered and Improved Seed Produced in 1919 and offered for sale by the Canadian Seed Growers' Association,

recently issued, contains considerable information regarding standards for registered seed, directions to purchasers, and a list of registered and improved seed available.

Questions and Answers Regarding Farmers' Co-operative Societies in Quebec, by Rev. J. B. A. Allaire, Director of Co-operative Societies for Quebec, is a concise work on co-operation written in the French language. It treats the subject by the question and answer method so completely that information relative to all possible features of co-operation in that province are included.

Canadian Swine Breeders' Record Vol. 30, 1919. This volume, compiled and edited in the office of the Canadian National Live Stock Records, Ottawa, contains the following pedigrees,—Yorkshires 62748-68273, Berkshires 50910-54505, Chester White, 18092-19934, Tamworths 12406-13177, Hampshires 1673-1909, Poland China 6975-7942, Duroc Jerseys, 11186-13468.

Essays on Wheat, by A. H. R. Bullar and published by the MacMillan Company of Canada, is a story of Marquis Wheat of which approximately 300,000,000 bushels were raised in 1918 all from a single grain planted in an experimental plot in 1903. Among other topics included in the book are "Early History of Wheat Growing in Manitoba," "The Origin of Red Bobs and of Kit-chener" and "The Wild Wheat of Palestine."

NOTES

Fifteen Saskatchewan schools have already obtained the special government grant for noon hot lunch equipment.

In Saskatchewan in 1918 forty-one agricultural co-operative associations shipped 689 cars of live stock for which \$1,558,621.14 was received.

Under the "Agricultural Co-operative Associations Act" of Saskatchewan 458 associations have been registered and 57 dissolved. There are now 401 associations doing business in the province.

The Dominion Shorthorn Breeders' Association has appointed Mr. J. B. Davidson of Carman, Manitoba, as western secretary and field man. Mr. Davidson's territory will extend from the Great Lakes to the Pacific Coast.

One hundred and sixty-seven co-operative credit banks have been established in the province of Quebec. These have a membership exceeding sixty thousand, assets of over

ten million dollars and an annual cash turn over of fully thirty million dollars.

The British Columbia Poultry Association have arranged a circuit of eleven poultry shows to be held next fall and winter. The series will commence in the second week of November with a show at Chilliwack and will conclude with a show in Victoria the first week in January, 1921.

Lady Victoria, a white Wyandotte pullet bred at Vancouver Island Experimental Station, Sydney, B.C., is the first hen of the experimental farm that has laid three hundred eggs in one year. She was hatched April 28, 1918 and started laying on December 12, when two hundred and twenty-eight days old.

Since the beginning of the current fiscal year May 1st, 1919, the Saskatchewan Department of Agriculture has sold the following live stock under the provisions of the "Live Stock Purchase and Sale Act,"—pure bred bulls 128, grade heifers and cows 1,508, pure bred rams 80, pure bred ewes 36, grade ewes, 2,428.

An initial purchase of Duroc Jersey hogs of special merit has been made by the University Farm in British Columbia. The herd leader was a champion at Calgary last year and his sire is by Defender who was twice Grand Champion at the International Show at Chicago. Three of the sows have pedigrees showing strong traces of champion blood.

At the Manitoba Dairy Show held in Winnipeg in February there were 225 entries in the section open to all the provinces, for 14 lb. boxes of solid pack butter made in September last and held in cold storage in Winnipeg since then. In the placings Alberta won first, second and third, Quebec fourth and fifth, Manitoba sixth, and Quebec seventh and eighth.

A farm paper publishing company in the State of Iowa on the security of members of boys' and girls' clubs provides money up to \$25 for a single member, and not exceeding \$50 in one family, at 6 per cent interest, for the purchase of pigs, calves, sheep, poultry and seed to be used in club work. The members

agree to return the money with the interest on or before one year after the date of loan.

During the months of January and February the reports, of Ayrshire cows that qualified in the R.O.P. test, received in the secretary's office were made up from 14 mature cows, 7 four year olds, 13 three year olds, and 30 two year olds. The exceptionally good records made by many of the two year olds were especially noticeable. Quite a number of them given over 9,000 pounds of milk testing more than 4% butter fat.

Through the co-operation of the Home Branch of the Soldier Settlement Board, the Women's Auxiliary of the Great War Veterans Association and the Women Grain Growers' Association, rest rooms for farmers' wives have been fitted up at Maple Creek, Alberta and Swift Current, Saskatchewan. At Maple Creek a local bank provided the necessary rooms, heated and lighted. These have been fitted up as a community centre for the rural women who visit the town.

INDEX TO PERIODICAL LITERATURE

The Canadian Countryman, Toronto, Ont.—

Feb. 28,

Modern Methods of Clearing Land. C. M. Laidlaw, B.S.A., Ranch Specialist, Ontario Department of Agriculture, page 5.

The Rural School Fair in Ontario. R. S. Duncan, B.S.A., Supervisor, Agricultural Representatives, Toronto, Ont., page 6.

Mar. 6,

What Real Tractor Service Means. L. G. Heimpel, B.S.A., Ontario Agricultural College, Guelph, page 3.

Fertilizers for Tobacco. H. A. Freeman. Tobacco Inspector, Experimental Farm, Ottawa, page 4.

Pointers on Producing Hatching Eggs. Professor M. A. Jull, Manager Poultry Department, Macdonald College, page 5.

New Varieties of Fruits. J. W. Crow., Professor of Horticulture, Ontario Agricultural College, page 5.

How Does Canadian-Grown Root Seed Compare with Imported. Dr. M. O. Malte, Dominion Agrostologist, page 41.

Mar. 13,

Some Leading Varieties of Grain Crops. Dr. C. A. Zavitz, Professor of Field Husbandry, Ontario Agricultural College, page 3.

Why Dairy Products Should be Graded. H. H. Dean, Professor of Dairy Husbandry, Ontario Agricultural College, page 5.

Making Poultry Pay. Professor M. A. Jull, page 17.

Some Suggestions on Spraying. W. A. Ross, Dominion Entomological Laboratory, Vineland Station, Ont., page 21.

Mar. 20,

The Truth About Northern Ontario. C. M. Laidlaw, page 4.

Fertilizing Flue-Cured Or Bright Tobacco. H. A. Freeman, page 20.

The Canadian Farm, Toronto, Ont.—

Feb. 25,

Late Winter Pruning. R. H. Helmer, Superintendent, Summerland Experiment Station, B.C., page 5.

The Canadian Horticulturist, Peterboro, Ont.—

Mar.,

Up-to-Date Pruning Practices. M. B. Davis, Assistant in Pomology, Experimental Farm, Ottawa, page 57.

To Control the San Jose Scale. L. Caesar, Professor of Entomology, Ontario Agricultural College, Guelph, page 59.

Fertilizer Experiments. W. T. Macoun, Dominion Horticulturist, page 62.

- The Value of Basic Slag.** Dr. F. T. Shutt, Dominion Chemist, page 62.
- Plant Breeding.** Professor J. W. Crow, page 64.
- Control of Cabbage Root Maggot.** Arthur Gibson, Assistant Dominion Entomologist, page 65.
- Lessons from the 1919 Fruit Season.** F. H. Steele, Chief Fruit Inspector for Prairie Provinces, Winnipeg, page 68.
- New Brunswick Orchard Work.** A. G. Turney, Provincial Horticulturist, Fredericton, page 79.
- The Canadian Horticulturist and Beekeeper*, Peterboro, Ont.—
Mar.,
Brood Diseases of the Apiary. Professor E. E. Millen, B.S.A., Provincial Apiarist, Ontario Agricultural College, Guelph, page 63.
- The Canadian Poultry Journal*, Hamilton, Ont.—
Mar.,
Increase Egg Consumption at Home and Abroad.—Value of Eggs as Food. W. A. Brown, Chief of the Poultry Division, Live Stock Branch, Department of Agriculture, Ottawa, page 73.
- The Canadian Poultry Review*, Toronto, Ont.—
Mar.,
Poultry Feeds and Feeding. George Robertson, Assistant to Dominion Poultry Husbandman, page 139.
Possibilities of Production. F. C. Elford, Dominion Poultry Husbandman, page 171.
- The Canadian Power Farmer*, Winnipeg, Man.—
Feb.,
Outlook for Farming. Hon. Val. Winkler, Minister of Agriculture, Manitoba, page 21.
- The Educational Review*, Fredericton, N.B.—
Mar.,
Improving School Premises. L. A. DeWolfe, B.A., M.Sc., Director, Rural Science Schools, Truro, page 157.
- The Farmer's Advocate and Home Magazine*, London, Ont.—
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Our School Department. Geo. S. Johnson, B.A., Whitby High School, page 378.
- Mar. 4,
Co-operative Fertilizer Experiment with White Burley Tobacco. H. A. Freeman, page 420.
- The Farmer's Advocate and Home Journal*, Winnipeg, Man.—
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Comparative Profits from Different Forms of Dairying. L. A. Gibson, Dairy Commissioner for Manitoba, page 247.
- Feb. 25,
The Correct Value of Head Selections. W. T. G. Wiener, B.S.A., Manitoba Agricultural College, page 289.
Factors which Control the Profits of Milk Cows. L. A. Gibson, page 290.
- The Farmers' Magazine*, Toronto, Ont.—
Mar.,
Ontario Apple Orchards. W. F. Kydd, Fruit Branch, Department of Agriculture, Toronto, page 46.
- The Fruit Branch Circular*, Ontario Department of Agriculture, Toronto, Ont.—
Feb.,
Some Spraying Observations. Professor L. Caesar, page 1.
Spraying Cherries for Insects and Diseases. Professor L. Caesar, page 3.
- The Grain Growers' Guide*, Winnipeg, Man.—
Mar. 3,
Milk Prices and Production Costs. A. H. Benton, Professor of Farm Management and Rural Economics, Manitoba Agricultural College, Winnipeg, page 30.
- The Globe*, Toronto, Ont.—
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Field Crops form Basis of Canadian Agriculture. Dr. C. A. Davitz, page 15.
Agriculture Can Pay Canada's Debt. Manning W. Doherty, Minister of Agriculture, Toronto, Ont., page 15.
Draft Horses of Quality will be in Keen Demand. Wade Toole, B.S.A., Professor of Animal Husbandry, Ontario Agricultural College, page 15.
Growers of Clover Seed have met Rising Market. T. G. Rayner, District Seed Inspector for Eastern Ontario, Seed Branch, Department of Agriculture, Ottawa, page 16.
- The Journal of Agriculture and Horticulture*, Quebec, Que.—
Mar. 1,
The Garden and Orchard. C. W. Baxter, Dominion Fruit Commissioner, page 168.
Farm Manure. R. Summerby, Professor of Cereal Husbandry, Macdonald College, page 172.
Canada's Need for Plant Pathologists. Professor B. T. Dickson, Macdonald College, page 174.
The Evolution of Agriculture. L. S. Klinck, President of the University of British Columbia, page 175.
The Purpose of the Agricultural Fair. H. Barton Professor of Animal Husbandry, Macdonald College, page 176.
Co-operative Dipping of Sheet in Quebec. R. M. Elliott, Sheep and Goat Division, Live Stock Branch, Department of Agriculture, Ottawa, page 179.
Eggs for Incubation. M. A. Jull, page 185.

The Macdonald College Magazine, Macdonald College, Que.—

Mar.,

What About our Seed Supply. J. C. Moynan, B.S.A., page 147.

The Maritime Farmer and Co-operative Dairyman, Sussex, N.B.—

Feb. 17,

Increasing Fertility of the Soil. Address by O. C. Hicks, B.S.A., Department of Agriculture, Fredericton, N.B., page 338.

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Field Experiments. J. A. Clark, B.S.A., Superintendent, Experimental Station, Charlottetown, P.E.I., page 377.

Spraying and Dusting. Geo. E. Sanders, Entomological Laboratory, Annapolis Royal, N.S., page 372.

Bees, Their Value in the Orchard. F. W. L. Sladen, Dominion Apiarist, page 378.

Mar. 16,

Limestone as a Factor in Present Day Agriculture. W. S. Blair, Experimental Station, Kentville, N.S., page 412.

Report of the Nova Scotia Superintendent of Dairying. O. A. MacKay, Dairy Superintendent, Truro, page 414.

Home Grown Crops. J. M. Trueman, B.S.A., Professor of Agriculture and Animal Husbandry, Nova Scotia Agricultural College, Truro, page 417.

The Monetary Times, Toronto, Ont.—

Jan. 23,

Growth and Possibilities of Rural Credit Societies. George W. Prout, M.L.A., Winnipeg, Man., page 18.

The Nor'-West Farmer, Winnipeg, Man.—

Feb. 20,

Hotbeds and Cold Frames. W. T. Macoun, page 245.

Agriculture in Manitoba. Hon. Valentine Winkler, page 259.

The O. A. C. Review, Guelph, Ont.—

Jan.,

A Message for 1920. Hon. S. F. Tolmie Minister of Agriculture, Ottawa, page 217.

Some Special Needs of Horticulture. Professor J. W. Crow, page 239.

Featuring the Farm Tractor Problem. R. R. Graham, B.A., Professor of Physics, Ontario Agricultural College, page 245.

Feb.,

A Brief History of the Department of Farm Management. J. C. Neale, B.S.A., page 274.

The Future of Fruitgrowing in British Columbia. F. M. Clement, Dean of the College of Agriculture, Vancouver, page 279.

The Future of the Tractor in Ontario. L. G. Heimpel, B.S.A., page 291.

The Poultry, Pigeon, and Petstock Journal of the West, Victoria, B.C.—

Feb.,

Value of Egg Laying Contests. George Robertson, page 19.

Seed Orders and Supplies. W. T. Macoun, page 22.

Agriculture is the great and important business of this country—with transportation and manufacturing trailing some distance behind—and to-day, in its accomplishments and possibilities, is founded upon a rock. Among the many things we have learned from the war is a realization that agriculture is the primal pursuit and enduring foundation of any nation, and the country which cannot feed and clothe itself is in a parlous way and vulnerable in the extreme.—*The Annalist, U.S.A.*

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty, International Institute Commissioner, Department of Agriculture, West Block, Ottawa.

SCIENCE AND PRACTICE OF AGRICULTURE

GENERAL INFORMATION

World Poultry Congress.—*Utility Poultry Journal*, Vol. 5, No. 1, p. 25. Newport, Salop, England, January, 1920.

Now that the war has been brought to a conclusion the many activities that were held up by it are gradually resumed. One of the most important of these is the international aspect of the poultry industry, and on the invitation of the International Association of Poultry Instructors' and Investigators the Netherlands Government have renewed the invitation received in 1914 for holding a Conference at the Hague in 1916. A Conference will now be held in the early part of September, 1921.

In due course an official invitation will be issued by the Netherlands Government through its Foreign Minister, asking for the co-operation of Governments of other countries in securing an adequate representation at the Congress, and in submitting subjects for consideration. For obvious reasons it has been decided not to issue this invitation until next year. In the meantime, however, and as a preparatory step, the International Association of Poultry Instructors has been asked to communicate with all Ministers and Departments of Agriculture, announcing such arrangements as have already been made.

An Executive Committee has been formed, consisting of members nominated respectively by the Netherlands Minister of Agriculture and the International Association. The following officials for the Congress have been appointed:

First President: Dr. J. H. Lovink, Food Administrator to the Netherlands Government, The Hague, Holland.

Second President: Mr. Edward Brown, F.L.S., President International Association of Poultry Instructors and Investigators, 31 Essex Street, London, W.C. 2, England.

Vice-President: Mr. F. B. Iohnis. The Hague, Holland.

General Secretary: Mr. G. S. Th. Van Gink, Ministry of Agriculture, The Hague, Holland.

Below is given information as to arrangements made:

Sections and Subjects.—The following subjects are submitted as a guide to those co-operating in other countries:

- A. State and other official action, including reconstruction.
- B. The training and necessary qualification of poultry instructors for educational and demonstration work.
- C. Science of Breeding and its practical application.
- D. Experiments and Investigation.
- E. Egg and Poultry production, inclusive of waterfowl and turkeys, as separate industries and in connection with cultivation.
- F. Opportunities for women in the Poultry Industry.
- G. Hygiene and Disease.
- H. Organization and Influence of exhibitions and laying trials.
- I. General Management and systems of Incubation and Rearing.
- J. International and National Trade in Eggs and Poultry, inclusive of co-operation and organization of Poultry Societies.

Sections and Sub-Sections will afterwards be defined, the Committee reserving the right to make such changes or modifications as may be required after the lists of proposed papers and readers are submitted.

CROPS AND CULTIVATION

Economic Analysis of the World's Shortage in Phosphate.—ANDERSON, L.B., in *The American Fertilizer*, Vol. 51, No. 7, pp. 47-59. Philadelphia, 1919.

In this analysis and summary of the world's phosphate industry, data are reported indicating that the total world shortage in phosphate production occasioned by the war

amounts to about 15,000,000 tons. The United States contains the greatest known phosphate deposits and is the largest producer of natural phosphate, but the phosphate export business which it was unable to do during the war was about 5,000,000 tons. Basic slag production did not increase rapidly enough to offset the shortage in phosphate, and Tunis now exports more phosphate than the United States.

The Special Commission to Europe reports a big demand for fertilizer. Ocean tonnage is the principal factor tending to retard the development of the business at the present time. The policy of the Shipping Board will be to meet foreign rates, and develop the business in so far as it can be consistently done. The present methods of selling phosphate are very favourable to the American exporter as contrasted with pre-war methods. Europe must import phosphate in large quantities if the original productivity of the soil is to be restored. The United States, owing to her splendid deposits, is in a good position to develop this business when normal conditions again prevail.

Value of Blast Furnace Dust as a Potash Manure.—*Journal of the Board of Agriculture*, Vol. 26, No. 4, pp. 387-396. London July, 1919.

Plat experiments with potatoes and mangolds to compare low-grade dust, medium-grade dust, high-grade dust, extracted dust, and German potassium sulphate containing respectively 2.21, 5.85, 8.9, 7.37, and 50.24 per cent potash as sources of potash are reported. The fertilizers were added at respective approximate rates of 2,200, 850, 550, 650, and 100 lbs. per acre.

It was found that the extracted and high-grade dusts gave the best results with potatoes, followed by the medium-grade dust and the potassium sulphate. The low-grade dust gave the poorest results. It is noted that the extracted dust, that is, dust very rich in potash from which the bulk of the water-soluble potash had been removed by boiling water, gave among the highest results. It was found to be advisable to add the dust well in advance of the crop owing to the relatively low availability of the potash.

The results obtained with mangolds did not correspond with those obtained with potatoes. Potassium sulphate gave the best results, while the poorest were with low-grade dust and late additions of medium-grade dust. The rest of the dusts gave about equal results in all cases, with about a 10 per cent increase in yield.

287.—Water Holding Capacities of Materials for Live Stock, Amounts Required to Bed Animals, and Amounts of Manure Saved by their Use.—WHISENAND, J. W., in the *Journal of Agricultural Research*, Vol. XIV, No. 4, pp. 188-190. Washington, July 22, 1918.

For 25 years agricultural literature has

repeated the erroneous conclusions as to the relative value of sawdust, wood shavings and different straws as litter. The conclusions are based on the capacity of the material to absorb the different liquids with which it is soaked, published in 1893 by Hebert and reproduced by Deherain in his "Traite de chimie agricole" (2nd Ed., Paris, 1902).

The author's experiments have shown that:—100lbs. of oat straw holds, in 24 hours, 250 lb. of water. Making this absorbent power equal to 100, the figures for the absorbent power of other materials are:—wheat straw, 84; fine dry Weymouth pine (*Pinus Strobus*) shavings, 74; mixed sawdust 64; mixed shavings 52.47. It is seen that oat straw holds about twice as much water as shavings and 15 to 20 per cent, more than wheat straw.

About 40 to 82 per cent more shavings than oat straw and 9 to 18 per cent more wheat straw are needed to make up the litter.

The amount of excreta retained by the litter which may be used as manure varies little whichever material is used.

The Vitality of Alfalfa Seed as Affected by Age.—HEADDEN, W. P., in *Proceedings of The Colorado Scientific Society*, Vol. II, pp. 239-249, 1919.

The author describes observations on the viability of various grades of alfalfa seed held over a long period of years without any effort to preserve the seed under definite temperature and moisture conditions.

It is concluded that good, sound, clean alfalfa seed, kept under fair but not ideal conditions, will retain its vitality for 23.5 years without any perceptible abatement. Good, commercial seed, preserved under rather disadvantageous conditions, retained a fair degree of vitality, 46 per cent, for 27.5 years, while very inferior seed, third quality screenings, kept under rather indifferent conditions, contained 16.5 per cent of viable seeds when 22.5 years old.

The Effect of Drying on the Germination of Cereals.—STAFLEDON, R. G., and ADAMS, M., in *Journal of the Board of Agriculture*, Vol. 26, No. 4, pp. 364-381. London, July, 1919.

The authors describe observations made at the English Seed Testing Station on the effect upon the germination of samples of wheat, barley, rye, and oats of drying the seed for three days at 40°C. (104°F.), and of holding it without drying for three weeks as compared with tests made upon the samples as received. Observations were also made on the effect of drying upon poorly developed and sprouted grain. The results secured are believed to have a significant bearing both on routine seed testing and on the problem of "conditioning" grain.

Some risk is said to be involved in sowing these cereals, even when in a sound condition, early in the fall and immediately after

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thrashing. Kiln-drying with subsequent air-drying is recommended for wheat, barley, and rye under such circumstances, while in the case of oats air-drying for two or three weeks is deemed best. It is also stated that tests made after drying or holding the seed are much more representative of the commercial value of the sample than tests made when the sample is received.

Potato Experiments.—WERNER, H. O., in *North Dakota Agricultural Experiment Station Bulletin* 129, pp. 3-22. Agricultural College, N.D., 1919.

Variety tests conducted at several points in the State and cultural experiments made at Fargo are described. The results of the variety tests are held to indicate that Irish Cobbler potatoes might well be grown to a greater extent, while Burbank is deemed unsuited to North Dakota conditions.

Experiments with different sized seed potatoes indicated that the best average results are secured from 1.5 oz. seed pieces. The selection of seed potatoes from the bin is regarded as much less satisfactory than hill selection. Little difference was observed in the comparative value of buds from various parts of the tuber, or between seed pieces having 1, 2, or 4 eyes. In a comparison of different methods of cutting seed potatoes, the maximum yield, 275.7 bushels per acre, was secured from hand cutting with the cuts made just above the bud and slanting towards the stem end of the tuber. The rapidity of emergence of shoots showed little difference for seed pieces of different sizes, for pieces from various parts of the tuber, for pieces with 1, 2 or 4 eyes or for seed cut in different ways, except that tubers quartered lengthwise were much slower than the others.

In 1918 the highest yield, 259.1 bushels per acre, was secured from the earliest planting (May 4). In spacing experiments made during 1918 the net yield decreased as the area per plant increased. The total yields ranged from 195.7 bushels per acre for a planting distance of 2.5 feet between rows with 24 inches between plants to 373.4 bushels for a distance of 2 feet between rows and 6 inches between plants. Seed treatment and spraying with Bordeaux mixture resulted in increased yields on both manured and unmanured plats, this being more marked on the former than on the latter. Hilling potatoes reduced the yield as compared with level cultivation.

In a study of the time and rate of tuber growth in Green Mountain potatoes during 1917, the total yield secured August 10th was 121.6 bushels per acre as compared with 220 bushels on September 11th when the vines were killed by frost. The daily increase during the first 10-day interval was found to be 2.34 bushels per acre, and during the last 3-day interval 5.27 bushels.

353.—**Inquiry on Farm Tractors in the U.S.A.**—I. YERKES, A. P., and CHURCH, L. M., in the *United States Department of Agriculture, Farmers' Bulletin* No. 963, 29 pp., Washington, June, 1918—II *Ibid.*, No. 1004, 27 pp., Washington, September, 1918.

No. 719 of the *Farmers' Bulletins* gave the results of an inquiry made in 1916 relating to over 200 tractor owners in the State of Illinois. Bulletin 963 sums up the data collected in the same state from 359 tractor owners during the summer of 1917 and from 284 in the spring of 1918. These data are applicable not only to Illinois, but also to the whole of the corn belt, as the farms studied show conditions comparable to those of the corn belt farms, where maize occupies about 40 per cent. of the cultivated area, against 60 per cent. under oats, wheat, hay, lucerne and clover; the farms are of regular shape and have an average area of 20 acres.

The number of tractor owners who consider that a tractor is a profitable investment increased from 80 per cent in 1916 to 90 per cent in 1917-18. The proportion and popularity of 3 furrow ploughs over 2 furrow ploughs has increased. The average size of the farms on which tractors hauling 2-3- and 4-furrow ploughs are used, are, according to the inquiry, 180, 250 and 300 acres respectively. To obtain complete satisfaction a tractor of suitable power must be bought. As a general rule it is better to make the mistake of buying too powerful a machine than a too low-powered one. The data show that the life of a tractor is from 7½ to 8 years, with an average of 45 days of work per year.

The total cost for repairs varies according to a large number of factors the most important of which is the care the owner takes of his machine whether working or not. Many tractors are repaired by the makers during the first year of service, unless it is the fault of the driver that repairs are needed. Out of 140 tractors used for one season (an average of 9 months), 38 needed no repairs; the others needed repairs costing from a few cents to \$100 and amounting to an average of \$22, which gives an average for the group of about \$15. The average cost of repairs for 158 machines, having been 20 months in use on the average, was \$39, while it was \$79 for 34 machines of an average age of 32 months. The figures quoted thus show as the average cost of repairs for the first 3 years of service, a proportion of 3 per cent. of the first cost, a proportion that increases afterwards, as is the case with most agricultural machinery. For the latter, the average repairs are estimated at 4 per cent., and it is not improbable that the average for tractors should be slightly higher.

From the information obtained, the area ploughed per day (actual work of 10 hours) with 2-3- and 4-plough tractors is 6½-8½ and

10 acres respectively. Many farmers overload their tractors by hauling ploughs having one mould board more than the number for which the tractors are built. This reduces the speed of the tractors and increases the cost of repairs, but it decreases the fuel consumption per acre and increases the average area ploughed per day. A tractor should not be overloaded save when finishing the work makes it necessary.

Fifty per cent. of the tractors were run on paraffin which cost 25 cents per acre, whilst petrol cost 50 cents. Lubricants cost 7.25 cents per acre. As regards the quality of the ploughing, more than 50 per cent. of the owners are of the opinion that it is better done by tractors than by horses; less than 3 per cent hold a contrary opinion.

II.—Results of an inquiry made in 1917-18 in the State of New York show that the use of tractors is increasing in the eastern United States. Three-furrow ploughs are the most used, and are particularly favoured by farmers having farms of 151 acres or more.

The average life of the tractor in the State of New York is $8\frac{1}{2}$ years, and 75 per cent of the tractors are run on paraffin, while all are started on gasoline. Detailed statistics on the cost of ploughing with a tractor show that it costs about the same as ploughing with horses.

355.—Soil Packing by Tractors.—RINGLEMANN, M., in the *Journal d'Agriculture Pratique*, Year 82, Vol. XXXI, No. 24 pp. 469-470. Paris, November 28, 1918.

The packing of the soil by tractor wheels is all the greater the more the soil is wet and the greater the pressure of the wheel per centimetre breadth of the tyre. On the other hand, the water content of the soil increases with the depth.

Great pressure (65 kg. per cm) applied on the surface of a medium loam soil before ploughing is felt down to a depth of 10 cm., and has a bad effect on plant growth, while no such consequences were noted when the pressure was 33 kg. per centimetre of tyre width. The bad effects of a moderate packing of the surface soil are in great part destroyed by the splitting-up that follows owing to the earth being turned over by the plough. When the packing acts on the bottom of the furrow, which is always moister than the surface layer of soil, it cannot be remedied by any subsequent cultural operation.

In very light soils, with a low clay content, that is, not very tenacious, packing the bottom of the furrow should not have any serious consequences to the crop; it has probably none at all in wholly sandy soils. In sandy loams and loams, local packing at the bottom of the furrow prevents the normal development of the roots. For a first period the vegetation covers the soil uniformly, but after a period of varying length, those zones

that correspond to the compressed strips are retarded in their growth, as the roots come up against the solid wall formed by the packed areas and are only able to utilize a depth equal to that of the furrow slice, while between these compressed zones the plants grow more vigorously as their roots can penetrate deeper than those limited to the depth of the packed area.

The same thing happens if the strips form a kind of continuous flooring at a certain depth when parts working with a rotary motion, and whose speed at the circumference is greater than the speed of forward movement, slip at the bottom of the depth being worked.

359.—Motors for the Fixed Farm Machinery.

—ROLET, A., in *La Vie Agricole et Rurale*, Year VIII, No. 49, pp. 407-412. Paris, December 7, 1918.

After having considered the advantages of motors, the author studies the various types of engine used to drive the different machines that do the indoor work of the farm. From technical and economic considerations the internal-combustion engine, whether using petrol or benzol, is the most important in most cases, as it can be so easily installed, occupies so little space, on a bed, bracket or trolley (in this case it can be moved to the apparatus or the transmission system that requires to be driven), easy starting, requires little attention, etc. For the dairy industry, the engine should be placed in a separate room, and the place where the transmission passes through the wall between engine room and dairy should be fitted with a wooden casing to prevent injurious gases passing into the dairy. As indoor farm machinery runs at a relatively slow speed, an engine with a small angular speed should be chosen. If quick-running engines are used, reduction transmission should be put in to reduce the speed. Great speed means rapid wear, thus reducing the life of the engine and increasing the consumption after a certain time. Delicate machinery like separators should be started by hand if possible or, if not, by means of the usual device that allows the belt to slip partially on the pulley. When the engine is mounted on a trolley, it can be easily moved about if the machines are not conveniently near together. But if there are many machines at some distance apart, and which have to run at the same time, it would not pay to get a number of engines, and, in this case, a steam engine or an internal-combustion engine (especially those running on "poor" gas) should drive one or more *electro-generators* to supply current to *electromotors* driving the machines in the dairy, cider room, wine storeroom, etc. As regards this, the author suggests that, if a 5-6 H.P. internal-combustion engine is already available, the procedure to be followed could be like that indicated by M. L. Martin at the

"Academie d'Agriculture" when he communicated the results of trials with a 6.75 H.P. shunt generator running at 1,600 revolutions and a 1.25 H.P. shunt dynamo, with a speed reducing-gear mounted on a trolley giving a speed of 185 revolutions per minute at the counter-shaft; these results were as follows: strawcutter: power required 1.6 H.P.; average strength of current required, 12 amperes; cost per hour: 57 centimes, with current at 40 centimes the kilowatt—root-chopper: 1.3 H.P., 10 amperes, 48 centimes—root washer: 0.5 H.P., 4 amperes, 19 centimes—fertilizer crusher: 1.3 H.P., 10 amperes, 48 centimes—cake-crusher: 0.6 H.P. 5 amperes, 24 centimes—grain crusher: 0.4 H.P., 3 amperes, 14 centimes—winnow: 0.6 H.P., 5 amperes, 24 centimes. Very convenient electro-generating sets can be bought in which the internal-combustion engine is placed with the generator. Given its advantages the electric motor is quite indicated if an electricity company supplies the farm with current; it is also advisable if water power is available.

The "poor" gas engine is the most economical internal-combustion engine, but, like the steam engine, it takes some time to start it; it is most suitable and especially economical in those places where it has to run continuously.

The author next deals with the power of the motor and he advises the would-be buyer to visit a farm plant so as to see what power is actually required before buying. Generally speaking an average butter-making dairy requires from 3 to 4 H.P. A separator taking 3,000 litres (660 gallons) per hour requires 1.5 H.P.; one of 4,000 litres (880 gallons), 2.5 H.P.; large butter workers, 1-4 H.P. Some small freezing machines can be run with 1-4 H.P. electric motors. Four H.P. are required for a food-mixing room, including a mill, a crusher, furze crusher, root-pulper, fresh-bone cracker. If an electric motor is used, the transmission must be doubled as the various machines run at very different speeds.

The author gives figures which he has checked on various farms showing the electric current measured at the generator required for various machines, such as the Protte thresher, root-choppers, straw-choppers, etc.

Various installations set up in different parts of France representing the different types of farming and using different types of engines for driving the indoor farm machinery are described, plans being given as illustrations of the various types.

PLANT DISEASES

387.—Lime Sulphur Mixture for the Control of Wheat and Barley Smut.—MACKIE, W. W., in *Science*, N.S. Vol. XLVIII, No. 1247, pp. 515-516, Lancaster, Pa., November 22, 1918.

The control of stinking smut of wheat along the Pacific coast seems to depend largely on the prevention of re-infection of the treated grain by spores of the agent of the disease in the soil or on its surface. Even when a field is free from smut the soil may be infected by neighbouring fields or by threshing, when numbers of smut spores are scattered in the air and carried for miles by the wind. Treatment with formaldehyde, so efficacious and economical in States east of the Rocky Mountains, where infection of the soil does not appear to exist, is useless when the soil is infected. This is due to the immediate evaporation of the formaldehyde when the solution dries on the grain.

On the Pacific coast wheat growers usually agree that grain treated with copper sulphate is almost or entirely free from infection from the soil. As the copper sulphate solutions used are very strong (1 lb. to 4-5 gallons of water) they injure considerably the germination of the wheat; to prevent this loss the caryopses treated with copper sulphate are washed in a lime solution. This double treatment greatly increases the cost of labour and farmers frequently ask whether the lime could not be mixed with the sulphate so as to have but one operation. Since lime counteracts the effects of the copper sulphate on the smut spores this method is not advisable.

To solve this question the author made experiments with lime-sulphur mixture. The preliminary experiments on wheat and barley showed the mixture, even in fairly dilute solutions, to be very efficacious against stinking smut of wheat and covered smut of barley. A thick coating of the mixture adheres to the grain, thus protecting it very well against infection from the soil. Even when a very strong mixture (1 part of mixture to 1 part of water) is used the preliminary experiments have shown no injurious effect on the germination of wheat or barley.

Basal Glumerot of Wheat.—McCULLOCH, L., in *Journal of Agricultural Research*, Vol. XVIII, No. 10, pp. 543-551. Washington, D.C., February 16, 1920.

In the course of an examination, in the United States laboratory of plant pathology, of various collections of wheat of the crop of 1917 made for the study of "black chaff," a bacterial disease unlike "black chaff" or any other reported wheat disease was discovered; and this same disease was observed again several times in the collections of 1918.

This disease affects the leaf, head and grain of wheat. On the heads the glumes show at the base a dull brownish black area. Sometimes this dark area extends over nearly the whole surface of the glume; but usually only the lower third, or less, is darkened; and often no discoloration is visible on the exterior. Glumes that have a normal colour on the outer surface may have the inner

surface discoloured. In practically all cases, dissection of the spikelet reveals more signs of disease on the inner surfaces than on the outer. Often a narrow dark line at the junction of the spikelet and the rachis is the only outward sign of the disease.

The grain enclosed by such diseased glumes shows varying degrees of undevelopment. The fact that grains are often well filled out would indicate that the disease sometimes appears late in the course of growth. In diseased grain the base, or germ end, varies in colour from a scarcely noticeable brown to charcoal black. In severe cases the surface texture as well as the colour suggests charring. In the discoloured areas bacteria are found in great abundance. Pure cultures have been secured from material collected in various States and in Canada.

This type of disease has been found in collections of wheat from New York, Michigan, Kansas, Missouri, Minnesota, North Dakota, South Dakota, Oklahoma, and Alberta, Canada.

The bacterium isolated from the infected glumes and grains is a medium-sized rod with rounded ends; in favourable media it forms long chains; it is actively motile by means of one to four polar or bipolar flagella; and capsules are present in 6-day-old beef agar cultures (Ribbert's capsule stain).

No spores, zoogloae, or involution forms have been observed.

The organism is Gram-negative and is not acid-fast.

Its staining reactions are rather feeble, but hot carbol fuchsin, anilin gentian violet, and saturated gentian violet gave good results. The stains must be washed out only with weak grades of alcohol (40 to 50 per cent), since strong alcohol takes them out too readily.

Growth is good in the usual culture media, though the peptone-beef media are less favourable for growth and retention of vitality than potato, milk, or Uschinsky's solution.

This organism appears to be an undescribed form, and because of the brown to black discolorations which it causes at the base of the wheat kernels and glumes the name *Bacterium atrofaciens*, n.sp., is suggested.

Treatment of Cereal Seed by Dry Heat.—ATANASOFF, D., and JOHNSON, A. G., in *Journal of Agricultural Research*, Vol. XVIII, No. 7, pp. 379-390. Washington, D.C., January 2, 1920.

In the investigation of possible control measures for certain seed-borne diseases of cereals which do not yield to the ordinary chemical and hot water seed treatments, the authors found dry heat to be particularly adaptable. An account of the progress so far made with these seed treatments is given in this article, which contains a brief review of

the pertinent literature, as well as a description of the methods employed by the authors. The results obtained to date are summarized as follows:

The data at hand indicate that the various cereals—barley, wheat, rye, and oats—especially when of good quality and well-dried, are able to withstand protracted exposures to dry heat at comparatively high temperatures.

It is definitely shown that the seed infections from bacterial blight of barley (*Bacterium translucens*) and the bacterial blight of oats (*Pseudomonas avenae*) may both be eliminated by exposing the infected seed to dry heat at temperatures which leave the seed still viable.

The results of these experiments indicate that a number of seed-borne fungous diseases, such as wheat scab (*Gibberella saubinetii* and *Fusarium* spp.), primary infections only, and spotblotch of barley (*Helminthosporium sativum*), are practically eliminated by the dry-heat treatment as used. Other diseases like netblotch (*H. teres*), stripe disease (*H. gramineum*) of barley, and Helminthosporium blotch of oats (*H. avenae-sativae*), as well as loose smut of barley and smuts of oats, are markedly reduced by the dry-heat treatment without materially injuring the germination.

INJURIOUS INSECTS

Report on the Effect of Air-Tight Storage upon Grain Insects.—DENDY, A., and ELKINGHORN, H. D., in *Report of the Grain Pests (War) Committee of the Royal Society*, No. 3, pp. 3-14. London, November, 1918.

Further experimental evidence is adduced in this report as to the efficiency of hermetical sealing as a means of destroying insect pests of grain and flour. The results of the experiments detailed are, briefly as follows:—Destruction by hermetical sealing of infested wheat was obtained with larvae and eggs of *Calandra oryzae* at 75° to 80° F. in 28 days, with larvae and eggs of *C. granaria* at the same temperature and period, with larvae and pupae of *C. oryzae* at 88° F. in 25 days. It was found that the early stages of *C. oryzae* are apparently a good deal more susceptible to the effects of hermetical sealing than the adults. An apparently clean sample of Indian wheat, kept for a few months at a warm temperature in a moist atmosphere, became badly infested with *Rhizopertha dominica*, but after hermetical sealing for 23 days at 88° F. the grain was found to be insect-free and after keeping at room temperature for nine weeks still showed no living insects. This beetle was entirely destroyed by hermetical sealing for three days at 88° F. in a small air-space. Larvae of *Trogoderma khapra* were destroyed in a small air-space by hermetical sealing for 6 days at 88° F., but the indications are that

in a large air-space this species would be considerably less affected than *Calandra* spp. Further experiments in this connection are desirable. The destruction of all insects was obtained by hermetically sealing wheat infested with *Tribolium castaneum* for 2 days at 88° F.; *Laemophloeus* sp. was destroyed in 3 days at 88° F., *Silvanus surinamensis* in 2 days, adults of *Gnathocerus cornutus* in 5 days, larvae of the same species in 3 days, and larvae of *Ephesia kuhniella* in 5 days, all at 88° F. Flour heavily infested with larvae of *E. kuhniella* was cleared of infestation by sealing for 7 days at 84° F. to 87° F. Mites occurring abundantly in wheat were destroyed by sealing for 24 hours at 75° to 80° F., and again, in a large air-space, in 1½ hours at 88° F. The mite in this case was probably *Tyroglyphus siro*.

In the light of these experiments, it is considered probable that air-tight storage is the best method of preserving grain and cereal products from the attacks of insects or mites, and the same method would also apply to rats and mice. The authors refer to the apparent failure of this method as applied to army biscuits, and express doubt as to whether in really hermetically sealed tins any serious damage from *Ephesia kuhniella* and other insects could arise. It is suggested that the army authorities should investigate further with a view to determining how far damage can occur in really air-tight tins in which the air-space is kept as small as possible. It is recognized that an experiment with weevil-infested wheat on a large scale is desirable, and it is hoped to carry out such an experiment in the near future.

Prevention of Heating in Wheat by Means of Air-Tight Storage.—DENDY, A., and ELKINGTON, H. D., in *Report of Grain Pests (War) Committee of the Royal Society*, No. 5, pp. 10, London, July, 1919.

With reference to the efficacy of air-tight storage for dealing with infested grain the possibility of the process known as "heating" under these circumstances has been the object of recent experiments. Previous literature on the same subject is reviewed.

These observations show that not only does "heating" not take place under air-tight conditions, but this treatment also prevents the growth of moulds, even in the presence of excess of moisture. The experiments were carried out on small quantities in thermos flasks, and owing to the purposely exaggerated moisture the wheat became acid. This may impair its milling value, but there are no grounds for believing that this acidity could develop in normally dry wheat under similar conditions. The limit of safety as regards moisture for wheat intended for prolonged treatment requires further investigation on a larger scale. The temperature charts given present two distinct maxima, suggesting the presence of two distinct processes of fermentation.

The first is due to enzymes in the grain itself, while the second may be due to microbic fermentation resulting in the rotting of the wheat.

A Study of the Plant Lice Injuring the Foliage and Fruit of the Apple.—MATHE-SON, R., in *Cornell University Agricultural Experiment Station*, Mem. 24, pp. 683-762. Ithaca, N.Y., June, 1919.

The three apple-infesting Aphids dealt with in this paper are *Aphis pomi*, DeG. (*mali*, F.) (green apple aphid), *A. sorbi*, Kalt. (rosy apple aphid) and *Siphonaphis padi* L. (*A. avenae*, F) (grain, oat, or apple-bud aphid).

A. pomi is the most abundant and widespread species, causing much injury every year in bearing orchards and in nurseries, and remaining upon apples through the season, without migration to other hosts. The characteristics distinguishing the three species are detailed. To avoid confusion in the identity of *A. pomi*, the synonymy is discussed at length and a useful bibliography is given. The view is expressed that this species had been imported into America prior to 1854.

A summary of the life-history of *A. pomi* has been given previously. Brittain has reported that in Nova Scotia on different varieties of apple the eggs hatch at the time when the buds on such varieties are showing green. Whether this will prove correct for other parts of the country remains to be seen. It is known that a very large percentage of the eggs do not hatch, so that predictions as to outbreaks cannot be made from any examination during the dormant season. Factors that are generally considered to hinder the eggs from hatching are climatic conditions, such as sudden drops in temperature or periods of cold rain, predaceous birds and insects, and non-fertilization of the eggs. It is doubtful whether non-fertilized eggs of this species will survive the winter and hatch in the following spring. The activities and reproductive capacity of the various generations is discussed and recorded in a series of tables, reproduction in the stem-mother being found to extend from the beginning of the blossoming period almost up to the beginning of the normal June fruit-dropping period. The various nymphal stages are described. From early June onwards there are 14 viviparous generations following in rapid succession and requiring from 8 to 12 days to reach maturity, the maximum period being for the 8th generation at the end of July and the 10th generation in the latter half of August. The third and later generations are the most injurious, congregating not only on the leaves and causing them to curl, but also on the rapidly growing shoots, the fruit stems and the fruit. The young shoots become stunted or die, and the young fruit is dwarfed and gnarled, though the rosy aphid (*A. sorbi*) is the more seriously injurious in these respects.

The maximum productive period (31.6 days) is for the stem-mothers, the next being 30.2 days for the 13th generation. The minimum productive period (13.7) days is for winged females of the second generation. The productive period varied considerably for the other generations, though it was in general shorter during the warmer part of the summer. The average daily production increased from 1.85 in the case of stem-mothers to 4.13 in the 5th generation and then gradually declined to 1.77 for the 13th generation. In the rearing cages the 14th generation produced the sexual forms, the males however constituting scarcely 1 per cent of the sexual generation. In the case of *A. pomi*, the production of winged forms is for the purpose of distribution only and not for migration to different food-plants. In the rearing-cage work practically every generation produced a few winged forms, though the earlier generations give rise to the highest proportion in order to ensure widespread distribution. Although the factor of crowding was eliminated in the author's rearing work, the percentage of winged forms for any one generation did not seem to vary. This question of the production of winged forms requires further study and the results may prove of great economic importance.

A. sorbi, Kalt. (rosy apple aphid) is dealt with on the basis of extensive rearing experiments carried out in Ithaca in 1914-1916. The synonymy of the species is discussed, the author differing from the view expressed by Baker and Turner that the American species is distinct and should be known as *A. malifoliae*. He considers the correct synonymy to be as follows:—*A. sorbi*, Kalt. (*A. pyri*, Boyer of Koch, not *A. pyri*, Boyer; *A. malifoliae*, Fitch; *A. kochii*, Schout, of Theobald, not *A. kochii*, Schout; *A. pyri*, Boyer of Guillelte & Taylor).

The preferred, if not essential, summer food-plant of *A. sorbi* is the thin-leaved plantain, *Plantago lanceolata*, there being a remarkable parallel between the introduction and spread of this plant and the spread and increasing destructiveness of the Aphid. The life-history and the severe curling of the foliage caused by this species have previously been described. The reproductive capacity of the various generations is shown in a table, the maximum period for the stem-mother being during the last week in May and the first week in June. A description of all stages of the insect is given. At Ithaca the migratory forms of *A. sorbi* may consist of the winged females of the second, third or fourth generation. The author did not succeed in rearing more than four generations on the apple, though in some years there are undoubtedly more. In Nova Scotia the migratory forms have been found to be adults of the third generation. The factors that influence the early or late production of migratory forms have not been sufficiently studied: the necessity for investigating the influence of climatic factors is urgent, as it

has a large bearing upon problems of insect control.

It has been reported that *A. sorbi* has been reared throughout the season upon apple in Ontario, and the offspring of migratory forms on plantain have been transferred to apple and have there produced another generation. The ability of the species to maintain itself on apple alone has not however been confirmed; if this proves to be the case it may become a pest of the greatest importance.

The longevity and reproductive capacity of the spring and autumn migrants, as well as the true summer forms on *Plantago lanceolata*, are illustrated by charts. It is noticeable that the spring migrant has a shorter life and greater reproductive capacity than the spring forms on apple. It has been supposed that as the summer winged forms are produced in such relatively small numbers, they cannot be of great importance in the life-history of the species. The author does not consider a single season's work to be conclusive evidence on this subject, and points out that the greater numbers of enemies encountered on plantain necessitates a high productive capacity and also ability to spread to more distant food-plants.

The autumn migrants begin to return to the apple in Ithaca in late September, the winged females developing first. The males begin to appear somewhat later and continue migrating to the apple well into November. Descriptions are given of these forms. The oviparous females which are the immediate descendants of the autumn migrants infest the smaller twigs and branches where mating takes place. The eggs, which average about six for each female, are deposited around the base of buds, under small pieces of bark, or in any sheltered position.

In the case of *Siphonaphis padi*, L. (*Aphis avenae*, F.) (apple-bud or oat aphid) the author does not follow Baker in treating the insect infesting apple in North America as a distinct species, *A. prunifoliae*, Fitch. Its life-history and habits in relation to apple are discussed and the various forms and stages of each form are described. This species is not seriously injurious to apple.

The effects of attacks of Aphids on the apple tree and its fruit are discussed. The latter part of June is always the most serious period for Aphid infestation, especially if temperature and moisture conditions are favourable. During that time the stem-mothers probably cease reproducing and most of them die. The second and third generations are reproducing at their maximum rate, and the fourth generation reaches its maximum about the last days of June. After that time, the number of Aphids gradually decreases, in spite of the fact that the young *A. pomi* are being produced with great rapidity. Weather conditions are however more favourable for parasitic and predaceous enemies and these are then able to gain the upper hand.

Control of Green Apple Aphis in Bearing Orchards.—HODGKISS, H. E., in *New York Agricultural Experiment Station, Bulletin* 461, pp. 97-134. Geneva, N.Y. June, 1919.

The author's conclusions are as follows: The green apple aphis (*Aphis pomi*) lives on apple trees throughout the year. On account of the late spring migration of winged forms and the later breeding of the insect, the pest is difficult to control by a single spraying in the season. If control measures are unduly delayed the insect's activities may result in severe injuries, such as curling of leaves or deforming of fruits. Curled foliage and the stems of fruits, as well as the clusters of apples, afford hiding places for the Aphids, which are difficult to reach with the spraying mixture unless it is applied generously and with considerable force. Applications of coarse sprays in liberal quantities are necessary to wet the leaves and the insects thoroughly. Such treatments often reach Aphids that escape mist sprays, and by thorough and timely spraying the summer broods can be controlled even on trees of considerable size. The delayed dormant spray, by protecting the trees from early infestations, diminishes the opportunities for serious reinfestations from the late spring migrations. A nicotine sulphate and soap spray is a very satisfactory aphidicide on account of its rapidity in killing, ease of application, and its spreading and adhesive properties.

Nicotine sulphate and lime is especially advantageous on trees of medium size with large amounts of succulent growth, because of its deterrent influence on the insects in addition to its immediate killing properties. In planning spraying operations against the green apple aphis, chief dependence should be placed on the nicotine sulphate-soap spray for trees of unusual height. With plantings of younger trees or those newly set, especially where succulent stems are likely to be seriously injured, an application of nicotine sulphate and lime will prove an efficient and satisfactory treatment.

The following formulae are given for the above sprays:

Nicotine sulphate-soap solution:—Nicotine sulphate (Blackleaf 40) $\frac{3}{4}$ U.S. pint (1 pint in severe attacks) and soap 4 lb. to 100 U.S. gallons water.

Nicotine sulphate-lime wash:—Stone or hydrated lime 60 lb., copper sulphate 2-4 lbs. and nicotine sulphate $\frac{3}{4}$ U.S. pint (1 pint in severe attacks) to 100 U.S. gallons water.

Common Insecticides: Their Practical Value.

—WILSON, H. F., in *University of Wisconsin Agricultural Experiment Station, Bulletin* 303, pp. 15. Madison, Wis., 1919.

Recent experiments carried out to ascertain the relative value of various insecticides as such, and not as a control of any particular pest, were made on the Colorado potato beetle (*Leptinotarsa decemlineata*), sawfly larvae on willows and blister beetles. Both under field and laboratory conditions potato plants were chiefly used, as they are the main crop in Wisconsin.

Magnesium arsenate is mentioned as a new insecticide, but was not included in these tests.

Paris green apparently kills quickest, but it also has a tendency to injure foliage and to settle quickly, and its adhesive qualities are not as good as those of other insecticides. The amount recommended is $1\frac{1}{2}$ to 2 lb. to 50 U.S. gallons of water.

Hydrogen lead arsenate is the most desirable poison, as although it does not kill quite as quickly as Paris green, it adheres and spreads well on plants, causing practically no injury to the foliage. Basic lead arsenate is the safer form to use on tender plants in certain climates, but it is undesirable as a spray against insects that are not quickly affected by poison. From 2 to $2\frac{1}{2}$ lb. of powder to 50 U.S. gallons of water on Bordeaux mixture is recommended against *L. decemlineata*. For codling moth (*Cydia pomonella*) and leaf-feeding insects 1 lb. to the same amount of water may be used; this proportion with the addition of 1 lb. of laundry soap to increase its adhesiveness may also be used against cabbage caterpillars and other chewing insects.

Although zinc arsenite has a toxic power nearly equal to Paris green it cannot be used for fruit trees owing to the damage caused to foliage, but it is an efficient spray for *L. decemlineata*. Used at a strength of 2 lb. of powder to 50 U.S. gallons of water or Bordeaux mixture apparently no injury is caused to potato plants.

Calcium arsenate remains in suspension nearly as well as hydrogen lead arsenate and adheres equally well under favourable conditions. In certain forms its killing power is also nearly as good as that of lead arsenate and it may be used with safety if hydrated or unslaked lime is added in equal amounts. These experiments also included the testing of several proprietary insecticides and these are classified according to their efficiency.

AGRICULTURAL ECONOMICS

CO-OPERATIVE AGRICULTURAL CREDIT IN FRANCE AT THE END OF THE WAR

The remarkable development of agricultural credit business during the years preceding the outbreak of hostilities was appreciably affected by all the obligations and necessities arising out of the war.

Mobilization deprived the countryside of the young and strong men, and farming had for the most part to be carried on by women and old men who, generally speaking, hesitated to have recourse to agricultural credit in the absence of the head of the family. Moreover the high price of requisites, the scarcity of labour and the difficulties of transport prevented farmers from incurring large expense for their farms. Finally, the agricultural credit banks themselves found that their activity was impeded or even arrested by the fact that their chief servants were called to arms.

In spite of these unfavourable circumstances, most of the district banks have continued to render great services to their members and by means of an appropriate contribution of funds to help the agricultural syndicates to make, for their members, collective purchases of agricultural requisites.

In order to examine the working of agricultural credit in 1918, we must consider successively: (1) short-term credit (law of March 31, 1899); (2) individual long-term credit (law of 19 March, 1910); (3) collective long-term credit (law of 29 December, 1906); (4) the application of special laws aiming at meeting the new needs arising out of the war; (5) the various questions studied by the agricultural credit department in the Ministry of Agriculture.

Short-term Credit.—Short time-loans, made on principle for the time between the sowing and harvesting of a crop, and intended for the purchase of seed, manure, fertilizers, etc., have not been, for the reasons already given, either very numerous or very large. The district banks have been able to make these loans, without asking for new advances from the State, with their available resources. These resources are in the case of some banks considerable, owing to the limited number of their loans and the many repayments made by borrowers in consequence of the rise in the selling price of agricultural produce.

Individual Long-term Credit.—The district banks, which in the beginning granted long-term credit somewhat grudgingly, soon recognized the usefulness of loans of this kind which allow young farmers to build up country homes for themselves. The advances for which they applied to ensure the granting of loans of this kind passed from \$460,000 in 1910 to \$1,000,000 in 1912. In 1913 the advances applied for fell to \$700,000,

but this was only a passing reduction, and it is believed that the rise in applications would have been resumed in the following years. Unfortunately, mobilization, entailing the calling-up of young farmers and the difficulty, with the lack of the necessary staff, of examining the applications for loans received by the district banks, resulted in a limitation of the number of applications for advances to enable the granting of long-term credit.

Collective Long-term Credit.—The development of the co-operative societies, which was continuous up to 1913, was also interrupted by events. A certain number of societies which proposed, on the eve of hostilities, to apply for agricultural credit, were completely disorganized by the mobilization of their managers and members. Those which remained were not sufficient to ensure the course of business with their own produce only, and could not even get together a sufficient quorum to pass the necessary resolutions in a general meeting. On the other hand requisites were lacking, or their price, like that of building, notably exceeded the figures anticipated in the original specifications. Most of the co-operative societies consequently gave up the idea of carrying out their plans. However the prolongation of the war, and the great advantages which the societies could derive from the high selling price of their produce, induced some of them to make an effort to continue working and therefore to ask either for a first or for a complementary advance in order to cover the sums by which costs exceeded those contained in specifications made before the war.

Law of 6 October, 1916.—This law, which allows communes to obtain advances for bringing abandoned lands within their territory under cultivation, has not yielded all the results which might have been expected from it. On the one hand, the one year which it gave for repayment seemed a short period to allow for the remunerative farming of land which sometimes had been uncultivated for several years; and on the other hand, the distribution of gains and losses seems complicated. Lastly, the municipal receivers, charged to receive the advances and to pay them to those concerned, did not always discharge this duty with the necessary diligence. For this last reason, certain number of communes even gave up their prospect of receiving the advances granted to them because they had not found them available at the right time.

In these circumstances it was in the beginning of 1918, judged preferable in the interests of the communes to give them the

advances for which they asked, not under the law of 6 October, 1916, but under that of 7 April, 1917.

Law of 7 April, 1917.—This law, which also aims at providing special advances for bringing abandoned lands under cultivation, is complementary to that of 6 October, 1916, but is applicable to a wider field since it allows advances to be made not only to communes but also to co-operative societies and to societies for mechanical cultivation. It better meets the needs of farming because it makes the term of advances three years, a period which corresponds to the three-year crop rotation generally practised in the country. It provides for no distribution of gains and losses, and thus avoids the difficulties attaching to the execution of the law of 1916.

The law of 1917 was applied to some communes which asked for advances under the law of 1916, but above all it came to the help of private initiative. It is the co-operative societies for the cultivation of abandoned land which reaped the largest benefit from it. These societies, formed among farmers who pool their lands in order to farm more easily, render great service. Because they group their members' holdings they allow of the use of improved machinery, such as motor tractors, and thus lessen the difficulties due to the costliness and scarcity of labour. They make the advantages of grouping holdings for the execution of works of cultivation apparent to the peasants, and prepare the way for the consolidation of properties.

Unlike the law of 1916, that of 1917 does not insist on the formation of a paid-up capital by members of the society. The security it requires is found in the collective obligation which members assume, saving members of societies in the invaded districts who enjoy exemption. The particularly advantageous provisions of the law of 7 April, 1917, have already evoked a large number of applications for advances, notably from the co-operative societies in the liberated districts.

Some of the societies concerned found in March and June, 1918, that their territory was again occupied by the enemy, and re-constituted themselves in the interior of the country where they resumed the cultivation of abandoned lands. The impulse received by the farming societies is an interesting symptom. It proves that farmers more and more understand that it is by pooling their resources and their efforts that they will succeed in restoring prosperity to the agricultural industry.

Law of 9 April, 1918.—This law institutes special advances, which may amount to 10,000 francs and are for a maximum term of twenty-five years. They are intended for the purchase of small rural holdings for military pensioners and the civilian victims of the war. The law proposes that the

means of securing an independent life, by work proportionate to their often diminished physical capabilities, shall be procured for the victims of the war. It is hoped that it will establish on the land or bring back to it a considerable number of disabled men, whom it will enable to build up homes and recover their health. This law seems to have been very favourably received. As soon as the decree for its execution, dated 19 July, 1918, was published, the necessary instructions were issued to the district banks, through the medium of which the loans are made. A certain number of these banks have already taken the steps necessary for giving force to the law within their districts. Some of them have even made an application for the advance of sums for their loans.

The Power of Farmers in the Invaded Country to Obtain Agricultural Credit Loans.—Since several district banks, those of Lille, Cambrai, Peronne and Vervins, were within the invaded territory, and others, those of Rheims, Amiens, Arras and Oise, suffered much by military operations, the farmers belonging to these banks, who were refugees in the interior of the country, found it difficult to procure the loans necessary to them. The district banks in the districts where they were temporarily domiciled did not know them and showed a certain hesitation in accepting their applications. In order to end this state of affairs, which prejudiced the interests of farmers who were particularly worthy of help, a circular was sent on 27 July, 1918, to all the district banks, urging them to give all possible assistance to borrowers of this class as to whom information could often be obtained from the manager of their original district banks which had been evacuated to the interior of the country.

Law of 26 July, 1918, and Decrees of 21 and 24 September, 1918, as to the Moratorium.—Many farmers who had contracted loans with the district agricultural credit banks before the war, made a point of fulfilling their engagements as soon as they could, but this example was unfortunately not followed by all the borrowers who found themselves in a position to discharge their debts. The law of 26 July and the decrees mentioned above allow proceedings to be taken to some extent against these unconscientious debtors, and the district banks are asked to take note of these new provisions by a circular of 25 October, 1918.

Agricultural credit has for four years undergone a heavy trial. An institution which had not solid foundations would have been seriously shaken—its existence would even have been compromised—by the crisis through which agricultural credit has passed. The devotedness of the managers of agricultural credit banks, and the deep trust in them constantly evinced by the farmers, have however allowed the associations to retain all their vitality. With the return of peace

they will play a considerable role. The necessity of supplying large quantities of manure for land neglected since 1914, and of procuring agricultural implements at high prices, in order to compensate for the scarcity of labour, the execution of new laws, notably that of 9 April, 1919, which institutes special loans for the acquisition of small rural hold-

ings for military pensioners and civilian victims of the war, the development of syndicates and co-operative societies, and, in general, the imperious obligation to produce—all this will give to agricultural credit a very important place among factors for the economic restoration of the country.

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In addition to those already dealt with herein, the following is a list of the more important subjects treated in the February number of the International Review of Agricultural Economics. Persons interested

in any of the articles in this list may obtain the original bulletin on application to the Institute Branch, so long as the supply for distribution is not exhausted.

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AGRICULTURAL STATISTICS

AREAS SOWN TO WINTER WHEAT AND RYE

Countries	Wheat			Rye		
	1919-20	1918-19	Average 1913-14 to 1917-18	1919-20	1918-19	Average 1913-14 to 1917-18
	acres	acres	acres	acres	acres	acres
Belgium.....	304,000	301,000	.....	490,000	476,000	.....
Spain.....	9,511,000	10,383,000	10,085,000	1,930,000	1,807,000	1,835,000
France.....	11,369,000	10,985,000	12,703,000	1,959,000	1,810,000	2,170,000
Roumania (old Kingdom).....	1,321,000	2,969,000	4,701,000	99,000	219,000	204,000
Bessarabia.....	667,000	902,000	1,260,000	217,000	403,000	442,000
Canada.....	776,000	714,000	811,000	.....	.....	.....
United States.....	38,770,000	50,489,000	40,170,000	5,530,000	7,232,000	3,919,000
India.....	27,428,000	23,809,000	31,930,000	.....	.....	.....
Totals less Belgium.....	89,842,000	100,251,000	101,660,000	9,735,000	11,471,000	8,570,000

FOREIGN CROP CONDITIONS

United Kingdom.—The weather was unusually warm in the middle of February; later it was unsettled. Vegetation was generally forward. In the first part of March the weather was colder and more favourable for winter cereals. The area of winter wheat is smaller than last year. Condition of winter crops was good.

France.—At the end of February the weather was reported as ideal for agricultural work, and the growth of cereals was very forward. Early spring sowings were making a good start.

Belgium.—Early in March crop conditions were good and in the better districts the crop was growing well.

Spain.—Early in March the outlook for the new crops remained favourable.

Italy.—Persistent dry weather in February caused some complaints. Light rains early in March were beneficial to the wheat crop. Acreage normal.

Russia.—The outlook is regarded as fair. There were some frosts and snowstorms in South Russia in the latter part of February.

Roumania.—Severe weather followed by a milder spell is reported. There is no reliable news of the young crop. There is no probability of exports of wheat this year.

Germany.—The weather was generally favourable for winter cereals, which were suffering, however, from lack of manures.

North Africa.—Drought in Algeria has jeopardized the young grain shoots. In Tunis the situation was serious at the end of February on account of the drought. Latest reports state that beneficial rains have fallen.

Egypt.—The area to wheat and barley is smaller than usual. Conditions were good in January.

India.—Latest crop reports are favourable. Early in March fine, favourable weather prevailed, the harvest was fairly started, and prospects well maintained.

Argentina.—Early in March, fine, favourable weather prevailed, and the maize crop was practically assured. The quality of the new wheat was reported as excellent. The first official estimate of the new wheat crop places it at 214,144,000 bushels compared with 184,270,000 bushels last year and 149,612,000 the average of the five years 1913-14 to 1917-18. There are also good crops of oats and flaxseed.

Australia.—Reports early in March were to the effect that in most of the wheat growing regions the rainfall was sufficient. It is anticipated that old wheat shipments will last well into July, but exports of the new crop will probably be restricted until promise for the next harvest can be seen.

Chili.—The wheat crop was in excellent condition along with other cereals.

THE WHEAT AND RYE CROPS OF JUGO-SLAVIA

According to data from the Ministry of Food, the area under wheat in Jugo-Slavia, including Serbia, Croatia and Slovenia, in the year 1919 was 3,380,000 acres, and

under rye 682,000 acres. The yields are estimated at 50,956,000 bushels of wheat and 9,816,000 bushels of rye.

CROPS OF BULGARIA, 1914-18

The following table gives official figures of the principal crops of Bulgaria, including old and new territory for the period 1914-18.

	Area (Thousand acres)					Production (Thousand bushels)				
	1914	1915	1916	1917	1918	1914	1915	1916	1917	1918
Wheat.....	2,524	2,408	2,220	2,481	2,445	23,200	36,940	27,764	33,294	25,341
Rye.....	510	507	466	442	475	6,200	7,108	5,356	5,901	4,427
Barley.....	587	590	560	593	604	9,279	11,848	10,037	11,980	7,094
Oats.....	413	395	326	343	345	7,424	8,593	6,061	6,173	3,400
Corn.....	1,531	1,579	1,342	1,385	1,455	30,767	29,821	17,471	17,781	8,144

CEREAL CROPS IN SOUTH RUSSIA

In the absence of official data with regard to the cereal crops of Russia as a whole, the International Institute of Agriculture has considered it desirable to publish the subjoined information, although somewhat fragmentary. It should be noted that these data deal with the most productive provinces of South Russia, in normal times furnishing supplies to the northern regions of that country.

Under the auspices of the Supreme Economic Council a British Mission was despatched to South Russia to study economic

conditions, especially with respect to the cereal production of that region.

This Mission has supplied data as to the yields of wheat and rye in Ukraina in 1919. As regards wheat these figures specify results in each province and are comparable with the corresponding data published by the Russian Imperial Government in 1916 and previous years.

The total yield of wheat in the ten provinces of Ukraina in 1919 is estimated at 331,000,000 bushels compared with 269,930,000 bushels the average production

of the five years 1909 to 1913. In addition the stocks from previous harvests are estimated at 120,000,000 bushels, making a total available supply for the grain year 1919-20 of 451,000,000 bushels. The provinces of Ukraina produced in the period 1909-13, 42 per cent of the total production of wheat in European Russia exclusive of Poland.

The production of rye in Ukraina in 1919 was 185,700,000 bushels against the pre-war five year average of 162,000,000 bushels. Besides, the stocks from previous harvest amount to over 60,000,000 bushels. Before the war Ukraina produced 20 per cent. of the rye crop of European Russia.

The Government of the Kuban has recently published data of the cereal crops, showing that the yield of wheat in the territory of Kuban in 1919 was 58,264,000 bushels compared with a five year average of 74,070,000 bushels.

After much consideration of the figures, the British Mission reached the following conclusion, dealing with the aggregate yield of the territories of the Ukraina, Kuban, Terek and Don.

Taking into account the wheat yield of 1919 and stocks from previous harvests, and allowing for the quantities required for consumption within these territories,

and for supplies to other Russian localities, there remains a *surplus available for export abroad*; this surplus they estimate as *certainly not less than 55,000,000 bushels of wheat*.

In order to give some idea of the importance of aggregate yields of the regions dealt with by the British Mission (Ukraina, Kuban, Terek and Don) as compared with the cereal yield of European Russia, the subjoined table has been compiled:

Average Yield of Wheat During the Five Years 1909-13

Territories	Production.	Percentages as compared with yields of all Russia (1)
	Bushels.	
Ukraina.....	269,928,000	42.1
Kuban.....	74,073,000	11.6
Don.....	64,364,000	10.0
Terek.....	7,068,000	1.1
Total.....	415,433,000	64.8
European Russia (1)....	640,553,000	100.0

(1) 54 Governments (including Northern Caucasasia and exclusive of Poland).

IMPORTS AND EXPORTS OF WHEAT AND FLOUR

(Flour expressed in equivalent quantities of wheat)

(Thousands of bushels.)

Countries.	Imports				Exports			
	December		Total for twelve months		December		Total for twelve months.	
	1919	1918	1919	1918	1919	1918	1919	1918
Belgium (1).....	1,205	.....	4,256	.....	141	.....	847	.....
Great Britain and Ireland.....	16,120	18,947	178,834	175,948	48	28	511	325
Italy.....	6,709	7,279	95,503	78,671	31	56	913	323
Roumania.....	5	.....	8,518	.....	0	.....	0	.....
Sweden.....	94	1,136	4,073	2,403	0	46	58	47
Canada.....	3	185	116	329	13,205	13,426	113,113	100,373
United States.....	326	538	8,147	20,035	15,427	33,539	266,935	208,024
Argentina.....	.....	.....	.....	.....	19,737	3,318	126,545	119,030
India.....	0	0	7,606	90	202	292	2,382	23,852
Japan.....	660	551	11,452	2,851	0	0	2	2,869
Algeria.....	0	8	57	11	54	675	9,676	2,689
Egypt.....	62	349	1,132	764	1	1	1	127
Tunis.....	18	3	27	6	12	192	3,325	884

(1) Not including imports and exports for the Belgium Relief Committee.

GRAIN RESERVES ON FARMS IN THE UNITED STATES

The amount of grain on farms in the United States on March 1st 1920 as reported by the Department of Agriculture, Washington, is as follows:

Corn, 1,092,095,000 bushels, or 37.4 per cent. of the 1919 crop, compared with 855,269,000 bushels, or 34.2 per cent. a year ago and 1,253,290,000 bushels, or 40.9 per cent. two years ago.

Wheat, 165,539,000 bushels, or 17.6 per cent., compared with 128,703,000 bushels,

or 14 per cent. a year ago, and 107,745,000 bushels, or 16.9 per cent. two years ago.

Oats, 422,815,000 bushels, or 33.9 per cent., compared with 590,251,000 bushels, or 38.4 per cent. a year ago, and 599,208,000 or 37.6 per cent., two years ago.

Barley, 38,010,000 bushels, or 22.9 per cent., compared with 81,746,000 bushels, or 31.9 per cent., a year ago, and 44,419,000 bushels, or 21.0 per cent., two years ago.

LIVE STOCK STATISTICS

UNITED STATES

Farm animals	Numbers		Value	
	Per cent of preceding year	Total number	Per Head	Aggregate
Horses: Jan. 1:				
1920.....	98.3	21,109,000	\$ 94.39	\$ 1,992,542,000
1919.....	99.7	21,482,000	98.45	2,114,897,000
1918.....	101.6	21,555,000	104.24	2,246,970,000
1917.....	100.2	21,210,000	102.89	2,182,307,000
1916.....	99.8	21,159,000	101.60	2,149,786,000
Mules: Jan. 1:				
1920.....	100.8	4,995,000	147.10	734,779,000
1919.....	101.7	4,954,000	135.83	672,922,000
1918.....	103.2	4,873,000	128.81	627,679,000
1917.....	102.8	4,723,000	118.15	558,006,000
1916.....	102.5	4,593,000	113.83	522,834,000
Milk cows: Jan. 1:				
1920.....	101.2	23,747,000	85.13	2,021,681,000
1919.....	100.7	23,475,000	78.20	1,835,770,000
1918.....	101.8	23,310,000	70.54	1,644,231,000
1917.....	103.6	22,894,000	59.63	1,365,251,000
1916.....	104.0	22,108,000	53.92	1,191,955,000
Other cattle: Jan. 1:				
1920.....	98.7	44,485,000	43.15	1,919,445,000
1919.....	102.2	45,085,000	44.22	1,993,442,000
1918.....	105.8	44,112,000	40.88	1,803,482,000
1917.....	104.7	41,689,000	35.92	1,497,621,000
1916.....	107.4	39,812,000	33.53	1,334,928,000
Sheep: Jan. 1:				
1920.....	99.5	48,615,000	10.52	511,654,000
1919.....	100.5	48,866,000	11.63	568,265,000
1918.....	102.1	48,603,000	11.82	574,575,000
1917.....	97.9	47,616,000	7.13	339,529,000
1916.....	97.3	48,625,000	5.17	251,594,000
Swine: Jan. 1:				
1920.....	97.8	72,009,000	19.01	1,386,212,000
1919.....	105.1	74,584,000	22.02	1,642,598,000
1918.....	105.1	70,978,000	19.54	1,387,261,000
1917.....	99.6	67,503,000	11.75	792,898,000
1916.....	104.9	67,766,000	8.40	569,573,000

Horses.—The horse supply of the country reached its maximum in 1918; since then the numbers have been diminishing gradually, during the past two years the increased demand for feed for high-priced meat animals has made it relatively more costly to keep a horse on the farm. Also the use on farms of automobiles, trucks and tractors has been increasing. The average value per head of all ages is \$94.39, compared with \$98.45 a year ago, and \$108.03 ten years ago. The horse market has been a little unsettled and much uncertainty

prevails as to the future. The best demand during the past year has been in the South. Heavy decreases have occurred in numbers of western range horses.

Sheep.—The slight reduction in numbers of sheep is due to the decreases in the mountain States of Montana, Wyoming, Colorado, New Mexico, and Arizona. In most other States there have been increases. Prices have declined from the high level of the past two years, being \$10.52 per head, compared with \$11.63 a year ago, and \$4.12 ten years ago.

Swine.—Swine increased in numbers generally in the eastern and south-eastern States, but decreased most heavily in the group of States comprising Illinois, Iowa, Missouri, Nebraska and Kansas.

Although there are fewer hogs in the country than a year ago, their average weight is heavier, being approximately

150 pounds, compared with about 140 pounds a year ago.

A feeling of disappointment is widely expressed by the recent slump of prices. The average price per head on January 1st was \$19.01, as compared with \$22.02 a year ago, and \$9.17 ten years ago.

GERMANY

For 1919 the data do not include the territory to be given up, the Palatinate and Birkenfeld.

Classification.	1st Sept., 1919, (provisional figures)	1st Dec., 1915	1st Dec., 1913
Cattle.....	16,423,832	20,316,948	20,994,344
Swine.....	11,156,858	17,287,211	25,659,140
Sheep.....	5,823,957	5,073,478	5,520,837

DENMARK

Classification	15th July, 1919	15th July, 1918	15th July, 1914
Horses.....	558,471	544,999	567,240
Cattle.....	2,188,142	2,123,722	2,462,862
Sheep.....	509,466	470,051	514,908
Goats.....	44,537	41,411	40,670
Swine.....	715,909	620,880	2,496,706
Poultry.....	12,134,521	9,783,692	15,140,072

CZECHO-SLOVAKIA

It is not possible to give totals for the whole Republic of Czecho-Slovakia, as the figures for Bohemia, Slovakia, Moravia and Selisia are from returns taken at different dates.

Classification	Bohemia		Slovakia		Moravia and Selisia	
	May 31, 1919	Dec. 31, 1910	July 31, 1919	1911	1918	1910
Horses.....	199,427	250,428	149,299	296,256	120,636	172,739
Cattle.....	1,644,939	2,290,587	897,410	1,151,469	758,988	997,704
Sheep.....	144,963	152,998	532,320	446,026	22,790	29,865
Goats.....	605,229	406,362	89,392	29,033	238,166	243,253
Swine.....	471,799	1,012,798	564,061	701,513	260,197	778,038

MEAT PRODUCTION AND CONSUMPTION IN THE UNITED STATES IN 1919

(U.S. Crop Reporter, March, 1920)

Estimates of meat production in the United States in 1919 arrive at the total of 19,445,000,000 pounds of dressed weight, according to the Bureau of Animal Industry. Supplementary estimates of the weight of the edible offal made by the Bureau of Crop Estimates increase the amount to 22,573,000,000 pounds. Of this quantity,

3,170,000,000 pounds were exported; the imports, less the re-exports, were 468,000,000 pounds, and hence the net export movement was 2,702,000,000 pounds, and the consumption 19,781,000,000 pounds.

Although nearly half a million pounds of beef and beef products were exported from this country, in 1919, mostly to Europe,

nearly the same quantity was imported on the hoof, mostly from Canada, but partly from Mexico, so that the national surplus was only 45,000,000 pounds, or a quantity sufficient for this country's consumption for about two days. Of mutton and lamb the United States produced less than it consumed by 14,000,000 pounds. The great national surplus of meat and meat products in 1919 is found almost entirely in pork and pork products.

The per capita production of meat and meat products, including edible offal, was 211 pounds, of which 186 pounds were consumed at home. The beef and veal production per capita was 82 pounds, the con-

sumption 81 pounds; mutton and lamb production 6.13 pounds, the consumption 6.26 pounds; goat-meat production and consumption, 0.09 pounds; the pork production, including lard, 123 pounds, and the consumption 98 pounds, edible offal being included in all cases.

The net exports of meat and meat products were 12 per cent of the production, edible offal still included; of beef, not including veal, 0.58 per cent; of beef and veal, 0.52 per cent; of pork, 20 per cent; and the surplus of imports over exports of mutton and lamb was 2 per cent. of the production.

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DEPARTMENT OF AGRICULTURE

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COUNTRY LIFE OBJECTIVES

BY WM. B. VARLEY, ASSISTANT TO AGRICULTURAL INSTRUCTION ACT COMMISSIONER

THE First National Country Life Conference was held at Baltimore, Md., a little over a year ago, for the study and discussion of rural social problems in the United States. A report on its deliberations has recently been published, which will be interesting alike both to statesmen and publicists as well as to leaders and teachers whose work is associated with country life.

The committees of the Conference reached a number of conclusions as to the true objectives of country life. While not attempting to review them in their entirety, a reference to some of them is regarded as opportune.

The welfare of the rural population, according to the conclusions of the deliberators, is based upon a number of interrelated considerations, such as education, health, family welfare, government, morals, and religion. It is recognized that the dominant motive is the economic one. Any great rural civilization presupposes a reasonable degree of material prosperity based upon economic justice, thus insuring a fair return to labour and investment. The present day tendency is to permit economic considerations to dominate all others, whereas they are to be regarded rather as a means to an end, that end being the attainment of the higher values of life. That the farmer is more important than the farm is a fact that must not be lost sight of in seeking to develop a rural citizenship of the highest type on which to base a safe and sane democracy. For this reason true leadership will recognize the values of those great spiritual forces, education, co-operation and moral ideals, and will keep prominent the fact that rural prosperity depends to a large degree on setting these forces in motion.

It will perhaps not be amiss to call attention to the fact that the designers of the measure known as *The Agricultural Instruction Act* were appreciative of these considerations. While the Act aimed primarily at promoting rural effectiveness, with greater prosperity as the outcome, it was realized that such efforts should be co-ordinated with education for the young, with the promotion of family welfare, and with an attractive community life secured by the co-operation of the mature. The moral and religious aspects are less directly approached, as must necessarily be the case, in a measure of this kind.

With regard to the matter of rural education, this, the report states, should be adapted to the social and vocational needs of rural people, and should be both broadly cultural and broadly practical. An appreciative study of nature and of country life should be fundamental, leading in the higher grades to vocational instruction in agriculture and home-making.

No better definition than this could well be given of the purpose of the Act so far as elementary agricultural education is concerned. With the financial support it provides, the provinces, or a number of them, have been enabled to inaugurate plans for the accomplishment of just such objects. Thus we find provision for agencies affording courses of training suited to the requirements of those proposing to teach agriculture, and also for a very necessary supervision of this form of instruction. For the development of agricultural teaching in the schools, with its concomitants, nature study, school gardening, home projects, boys' and girls' clubs, and school fairs, the grant is very largely responsible.

In the more strictly vocational sphere, the grant is widely employed in financing such activities as the agricultural and household science short course, together with acre profit, pig and calf rearing, live stock judging, cooking, canning, and potato growing competitions. In the high schools, agricultural and household science courses are being developed, and in more than one province special vocational schools of agriculture have been established.

The report emphasizes the fact that the life of the family in the home and the social life of the community are distinct values in rural life and must be promoted. At the same time, the health of the individual and the sanitary conditions of the community are limiting factors in social well-being. Under *The Agricultural Instruction Act* the Women's Institute is recognized as a valuable agency for advancement in matters of this kind,

and effective financial aid is accorded the movement.

The Women's Institutes of Canada with a combined membership of 50,000 persons form the medium through which the farm home can be reached and influenced by various forms of social welfare propaganda. They are the medium for conveying instruction in household science and domestic art, cooking, nutrition, home nursing, sanitation and similar topics. They afford the women of the farm an opportunity for social intercourse, self-expression and development, often so much needed under rural conditions. Matters relating to social welfare, community welfare, education and other vital topics are considered and discussed, and the activities promoted by their means have a widely extended and highly beneficial influence.

Progress in every phase of country life, says the report, depends upon the discovery and development of compelling personalities as efficient community leaders. For this reason, the universities, colleges, and schools having a rural constituency should provide a well-rounded course of instruction for leadership in rural affairs. The recent forecast, published in this journal, of the agricultural college outlook, indicates that this fact is realized by those at the head of such institutions to a gratifying extent.

One is impelled to enquire at this point what should be regarded as the true objective of the agricultural college? It is sometimes criticized for not turning out a larger percentage of practical farmers. Then, again, it is criticized for not supplying the highly trained specialists required for teaching and experimental work.

The primary object of the agricultural college has hitherto been to prepare men for farm life. The secondary object has been to train workers in the more theoretical departments. The demand for extension workers, experimenters, scientific investigators, agricultural teachers, and rural leaders would seem to

indicate that the purely vocational aspects of the work of the colleges will, in the not distant future, become a secondary consideration, and that these institutions will assume more of the status of a university than is the case at the present time. It will be realized that even if every agricultural college student went home to farm, their combined numbers would be too insignificant to have any marked effect on the practice of agriculture in this country. The present day need in this respect is that a far larger percentage of country boys and girls should receive an educational training of such a character as will fit them for country life and country pursuits. This demand the centralized college of agriculture can never hope to meet. It does not so much matter whether

this training is made available through special agricultural schools, consolidated schools or high schools having agricultural departments, or through part time schools, so long as such training is brought within easy access of every country boy and girl. When this is accomplished—and in its accomplishment the *Agricultural Instruction* grant is lending and will continue to lend a large measure of assistance—a means will have been secured of influencing the agriculture of the whole country through educational methods suited to the needs of the farming community. At the same time, the agricultural college will be relieved of the present necessity of covering the whole educational field, and thus be enabled to specialize in more advanced work.

DEPUTY MINISTERS' CONFERENCE

A CONFERENCE, presided over by the Deputy Minister of the Federal Department of Agriculture, between the heads of the several branches of that Department and the provincial deputy ministers of agriculture, was held in Ottawa in March. At the opening session the Honourable Dr. Tolmie explained that in view of the obligations resting upon the agricultural industry, it was necessary that the utmost economy consistent with efficient administration be exercised by all government departments. The purpose of the conference, he pointed out, was that a better understanding between federal

and provincial departments might be reached in order to secure this result. The conference lasted for three days during which time the policies and methods covering experimental, investigational, and extension work were frankly discussed with a spirit that showed a desire for the most thorough co-operation. As a result of the conference certain more or less definite principles were agreed upon by the representatives with relation to a better division on the one hand and co-operation on the other of the work carried on by the respective departments.

COLLECTION OF ANNUAL AGRICULTURAL STATISTICS, 1920

AMONGST the statistical reforms accomplished or inaugurated by the new Dominion Bureau of Statistics, established in 1918, none is of more importance than that which is concerned with agriculture, the leading industry of Canada. It is essential that the mercantile, banking and insurance interests should have accurate information respecting the country's annual agricultural

production and that statesmen and legislators should know the volume and direction of the country's progress. To farmers themselves it is of supreme importance to know what areas are being devoted to particular crops in their own and other countries, how such crops are being extended or withdrawn from cultivation and what is the volume of production in one season as compared with another.

They should, by means of accurate information on these points be able to form their own judgment as to the local crops likely to prove most remunerative. Similarly, a knowledge of the numbers of farm live stock, and whether these are increasing or decreasing from year to year, is important to all dealers; and is at least of equal importance to breeders and producers. Moreover Canada, as a country adhering to the International Institute of Agriculture at Rome, has undertaken to furnish periodical reports on the agricultural production of the Dominion, receiving and publishing in exchange the valuable information respecting the agricultural production of other countries which the Institute collects and disseminates.

In Canada estimates of agricultural statistics by the Dominion Government have been made annually since

1908, these estimates having been compiled from the returns of crop correspondents in percentages of the previous year's data. Except for immediate and tentative purposes, this method has now been abandoned as imperfect, and during the past three years the annual agricultural statistics of the Dominion have been based upon returns of areas sown and numbers of live stock on the farm, collected from individual farmers in the month of June. This information is obtained by means of a simple cardboard schedule, reproduced herein, which is distributed to farmers through the agency of the rural school teachers and children. The cards, when completed, are first sent to the provincial government, who after having them sorted into counties or districts transmits them to the Dominion Bureau of Statistics at Ottawa for final compilation into totals by adding machinery.

Acreage under Field Crops.				Numbers of Farm Live Stock.			
	Acres		Acres		No.		No.
Spring Wheat.....		Potatoes.....		Stallions, 2 years old and over.....		Sheep.....	
Oats.....		Turnips.....		Mares, 2 years old and over.....		Swine.....	
Barley.....		Mangolds.....		Geldings, 2 years old and over.....		Turkeys.....	
Flax.....		Other Roots.....		Colts and Fillies under 2 years.....		Hens.....	
Rye.....		Fodder Corn.....		Mules.....		Chicks.....	
Peas.....		Land Seeded.....		Bulls for breeding.....		Geese.....	
Beans.....		for Hay.....		Milch Cows (only cows milked.....		Ducks.....	
Buckwheat.....		Land Seeded.....		or to be milked in 1919).....			
Mixed Grains.....		for Pasture.....		Calves under 1 year.....			
Other Grains.....		Alfalfa.....		Steers, 2 years old and over.....			
		Other Crops.....		All other cattle.....			
		Fallow.....					
		New Breaking.....					

The figures thus collected form a fairly sure basis for estimating the totals according to the ratio which subsists between the total number of farms and the returns actually received. After harvest and threshing, estimates are obtained from crop correspondents of the average yields per acre, which multiplied by the areas, give the total yields. The total yields, when multiplied by average values per unit, give the total values. The final results are adjusted after consultation between the Dominion and provincial authorities, and identical figures are then released for simultaneous publication by the Dominion and provincial governments, the former publishing the

figures for each province, and for the whole of Canada, and the latter publishing the figures in and for their respective provinces and in most cases by local counties or crop districts as well. There is in one or two cases some variation of procedure. For instance, in Ontario the process is reversed, and the cards are issued and collected by the Dominion government for compilation by the provincial government, the final estimates being calculated from the total acreage according to plans long in use. In British Columbia the cards are addressed and mailed by the Dominion Bureau of Statistics direct to the farmers, and the compilation is effected locally. But the essential

feature is that division of labour is mutually agreed upon, and the results obtained are identical; so that the conflict of figures which used to characterize the government agricultural statistics of Canada is now happily a thing of the past. Similar procedure is applied to the numbers of farm live stock as classified by ages, and information as to the number of living animals on the farm in June is collected on the same cards as used for crops. The system was applied experimentally for the first time in June 1917 in four provinces. In 1918 and in 1919 it was extended to all the nine provinces of Canada. The proportion of returns has varied from about 21 to 58 p.c. of the total number of farms, except in two of the western provinces last year, where the proportion fell below the minimum in consequence of the dislocation of arrangements by the Winnipeg strike.

As the time is now at hand for the collection of this year's returns of the areas sown and the numbers of farm animals, it is desirable to call the serious attention of farmers to the duty of filling up the simple schedule required. Any farmer who does not receive a card by the middle of June should apply for one either to the school teacher in his school district, to the Agricultural Department of his province, or to the Dominion Bureau of Statistics, Ottawa.

It is the aim of the Dominion and provincial statistical authorities to secure an annual return from every individual farmer in the Dominion.

The issue of trustworthy annual agricultural statistics is important for all classes of interests in Canada, but to none is it of greater importance than to farmers themselves, who otherwise carry on their industry in the dark and are liable to be victimized by unscrupulous traders. It is impossible to prevent, were it desirable to do so, the issue of annual estimates of grain and meat production; and consequently it is to the interest of the rural community that statistics relating to their industry should be accurate and trustworthy and be put forth on independent and unbiased authority. No individual returns are published, and the information collected is not used in any way for taxation purposes. It is confidently expected that as farmers become better acquainted with the system organized for their benefit and realize the practical value to themselves of accurate agricultural statistics there will be a continuous increase in the proportion of returns. Meanwhile, it should be remembered that whatever degree of error may attach to the figures issued is attributable to the estimate that has to be made from the actual returns. In fact, any imperfection of the system is due to the extent to which farmers, whether from apathy, negligence or mistaken prejudice, make default. In proportion as the number of returns is increased and the necessity for estimation is in consequence reduced will the risk of error be eliminated and the greater accuracy of the totals be established.

RESERVE LAND FOR SOLDIER SETTLERS

PLANS have been completed for throwing open a number of former Indian Reserves in Saskatchewan for the benefit of returned soldiers. The Ochopowace reserve, ten miles northeast of Broadview has a total area of 18,453 acres and is divided into 57 farming units averaging 324 acres. The price will be about \$3,000 for a farming unit. Poorman's reserve one hundred miles southeast of Saskatchewan in the

Touchwood Hills District with a total of 8,075 acres is divided into 29 farming units averaging 278 acres. The average selling price per farming unit is \$3,240. The Piapot reserve fifteen miles northeast of Regina with a total area of 16,318 acres divided into 54 farming units averaging 302 acres will sell at \$4,015 per unit. These units will be disposed of by ballot system about April 20th.

PART I

Dominion Department of Agriculture

EXPERIMENTAL FARMS

CEREAL DIVISION

WHAT HAS BEEN DONE TO IMPROVE THE WHEAT CROP IN CANADA

BY J. G. CARL FRASER, ASSISTANT CEREALIST

IT would require a large volume to record all the work done by the Federal Government to improve the wheat crop and to extend its cultivation in Canada. What has been done, is of no small importance. From 1886, when the Dominion Experimental Farms came into being, date the first really serious endeavours to improve the wheat crop of Canada.

Shortly after the inauguration of the Experimental Farms System, it was felt by those in authority that something should be done to improve existing grains and to introduce from abroad, hardy, high-yielding and high quality strains of grain, which would be likely to mature in districts where the season was somewhat short. With this end in view, some twenty-eight varieties were selected from grain offered for sale on the Corn Exchange in London, England, and representing the produce of the principal grain-growing countries of the world. Amongst these were four varieties of wheat from India—Indian Kurrachee, Indian Hard Calcutta, Indian Red Calcutta and Indian Club Calcutta. Upon testing these wheats, it was decided to obtain both information and further material from the same source. So, under instruction of the Minister of Agriculture, correspondence was opened with the Government of India. Through them inquiries were

instituted to find out what Indian grains were likely to be suitable to our Canadian climate.

A great many varieties were introduced from India, Northern Russia, and other places, but, after testing were not found very satisfactory in themselves, and are not now grown. However, some of these introduced wheats proved very valuable as parents for breeding hardy, high-quality strains.

Amongst other grain introduced by the Experimental Farms System was Bobs, a yellow branched wheat from Australia. The cultivation of this wheat was not pushed by the farmers and millers, as its pale yellow bran was greatly against it from the grading standpoint. The present day "Red Bobs" is a selection from this wheat.

Around 1903-4, *Kubanka*, a Durum wheat, was tested out by the Experimental Farms. This wheat proved valuable for very dry districts and is practically the only wheat of the earlier introductions grown to-day.

As mentioned above, most of the foreign introductions were not particularly valuable in themselves, but some of the varieties from northern Russia and some from India proved to be excellent parents from which to breed new and valuable varieties possessing desirable qualities.

Amongst the first crosses of any importance made by a Fife wheat on the wheats from northern Russia, were *Preston*, *Stanley* and *Huron*, of which

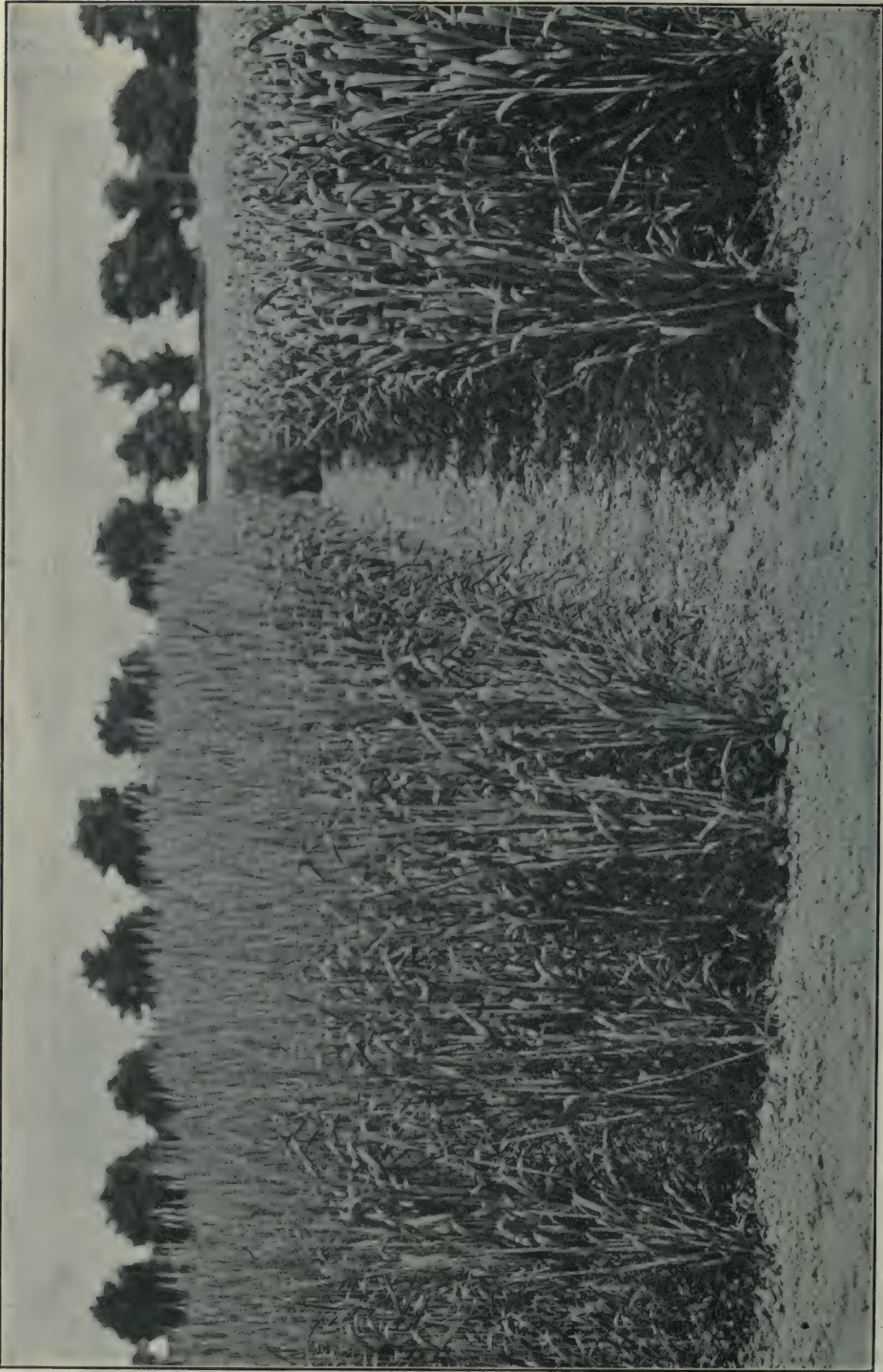
that standpoint, has been dropped. For besides being easily susceptible to disease, it has a soft kernel and produced flour of rather inferior



EARLY RIPENING VARIETIES OF SPRING WHEAT. 1. MARQUIS.
2. STANLEY (SELECTION A). 3. EARLY RED FIFE

the latter is now considered the best. Preston has nearly gone out of general use, and Stanley, while a beardless variety and desirable from

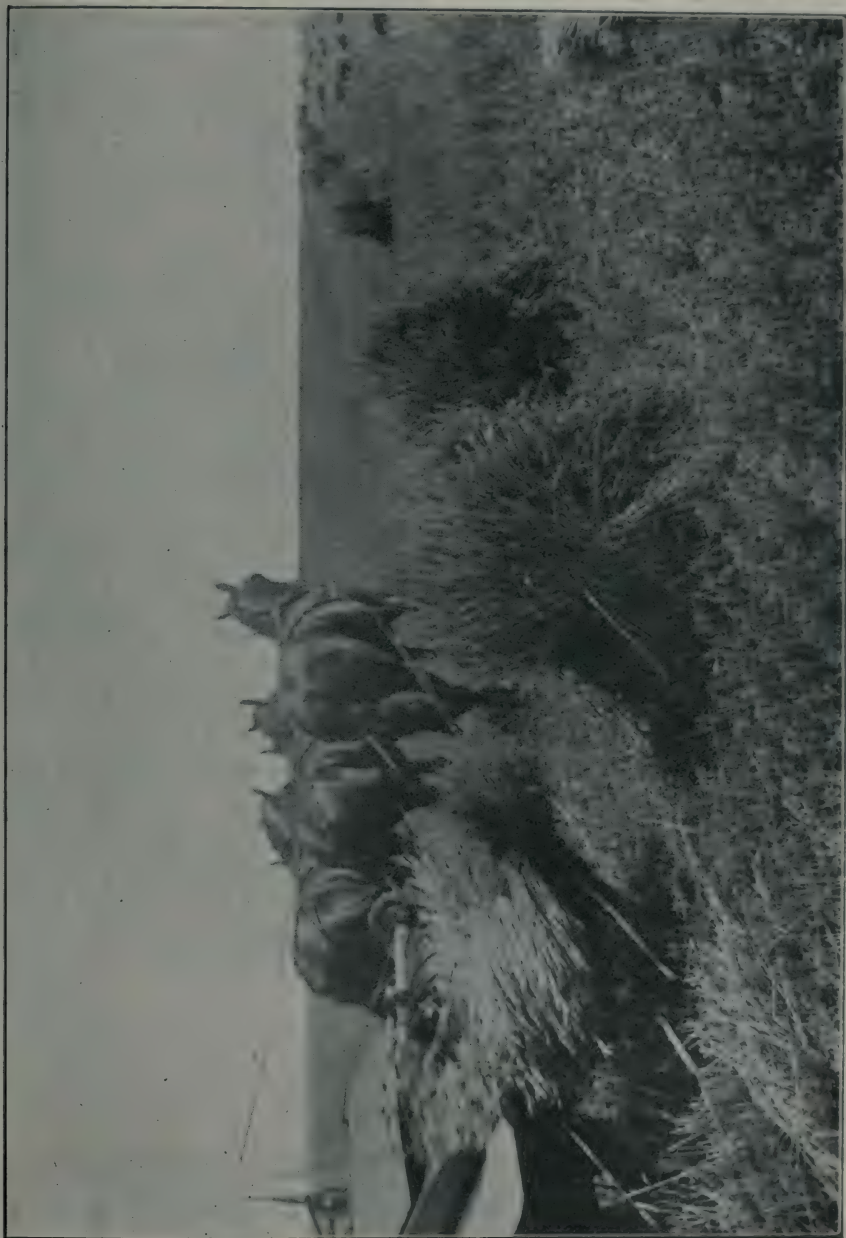
strength for bread-making. Huron, a red, bearded wheat, is still in use and is a variety very well suited to the eastern provinces, as well as to



PRELUDE WHEAT "IN BLOSSOM." MARQUIS WHEAT NOT YET IN HEAD. CENTRAL FARM, JULY 2, 1912

some places in Alberta and Saskatchewan. This wheat has done remarkably well at Beaverlodge and other points in northern Alberta.

This variety has a yellow bran and besides giving a good yield in certain localities makes a very good grade of flour when milled. At Fort Ver-



CUTTING RED FIFE WHEAT ON NON-IRRIGATED LAND, EXPERIMENTAL FARM, LETHBRIDGE, ALBERTA

Another wheat, which has made a noticeable stand and yield in far flung, outlying districts, is *Bishop*.

million, northern Alberta, it is very highly thought of, as it is comparatively early and gives an excellent crop.

Then, there is that wheat introduced by Dr. Chas. E. Saunders, Dominion Cerealists,—*Marquis*, the leading wheat of Canada, which has added twenty million dollars a year to the value of the Canadian wheat crop. The fact that this variety is from three to twelve days earlier in maturing than Red Fife and other varieties formerly grown, and that the grain does not readily shell out before cutting, plays a large part in its popularity. The straw is rather short and stiff and the heads are blocky in appearance; the kernels are dark red in colour, hard, and yield excellent flour. *Marquis* wheat is very productive, especially on rich soils and in rather dry climates.

Another cross-bred and still earlier ripening variety is *Ruby*, *Ottawa No. 623*, which ripens at Ottawa in about ninety-three days from date of sowing which is from three to twelve days earlier than *Marquis*. A great future is predicted for this variety because of its early ripening and good yielding qualities. It is especially valuable in districts where *Marquis* is too late in ripening and where there is a moderate rainfall. *Ruby* wheat has helped to make profitable the growing of wheat in places where grain crops were formerly frozen.

Prelude, *Ottawa No. 135*, is one which is outstanding for its earliness, ripening on an average in 87 days from date of sowing. With *Prelude's* early ripening qualities one does not expect such heavy yields as with

later maturing varieties in a good season. Flour of very high baking strength is obtained from this variety but not pale enough to be given the highest rank for colour.

Considerable work has been done in the way of producing improved strains of wheat by selection from commercial varieties. The most noteworthy of these selections is *Early Red Fife*, *Ottawa, No. 16*, obtained from ordinary Red Fife and from which it differs in a few details—besides being several days earlier, it has a higher yield; has larger kernels and has somewhat blunter heads. In baking and milling qualities it is the same as Red Fife and is an excellent wheat for rather dry districts in central and western Canada. It also does well in eastern Canada. Various other selections have been made, *White Russian*, *White Fife* and a host of others, which have more or less local importance but have not as yet achieved Dominion-wide fame.

The Dominion Government, through the agency of the Experimental Farms, has endeavoured, by their distribution of free, five pound samples of wheat, to introduce high quality, good flour making, and high yielding wheats which are especially suitable to the wide variety of districts, such as are to be found in Canada. Thus one can see the bigness and value of the work done by the Federal Government to improve the quality and value of the wheat crop in Canada.

DAIRY DIVISION

FARM DAIRY BUILDING

THE new building which is nearing completion at the Central Experimental Farm, Ottawa, is shortly to be occupied as the Farm Dairy Building. This edifice is in two parts. The main building is

50 by 40 feet and the ice storage department 35 by 28 feet. Between these two are a pair of cold storage rooms each 13 by 16 feet. The main building has three floors including basement which contains the cheese

room, boiler room, general storage, etc. The main floor is equipped with offices, operating rooms for butter and cheese making, a bacteriological laboratory and a ladies' rest room which will accommodate visitors to the Farm. The upper story is to be used as a residence for the dairyman in charge.

The exterior of this building is finished in rough cast stucco and the roofing material is asbestos slate. It presents a very neat appearance and is a credit to the Central Farm.

With the completion of this new dairy building it will now be possible to carry on experimental work which has been held back for many years owing to lack of facilities and suitable environment in which to do the work. The old building, erected thirty years ago, permitted no advanced work in bacteriology of dairy products whereas the new one is equipped with the most modern apparatus. Milk contamination, sterilizing milking machines and other apparatus and extended studies in

the production of certified milk can now be made.

The operations to be carried on in the new building are essentially those connected with farm dairying and all investigations, experiments and studies, will be based on the needs of farmers as differing from the factory dairy work which is conducted at the agricultural colleges and by commercial firms. The testing out of dairy utensils will be extended to include all the equipment used in the production of farm dairy products.

The modern equipment and ample space provided in this new building will enable the men in charge to achieve results for which dairy farmers have been looking for some time. The results obtained in pasteurization, butter making, testing of machinery, sterilizing of utensils, etc., will be made available to the country as quickly as possible and it is expected that the dairy industry which is already on the upward trend, will receive fresh impetus from the investigations and experiments carried on in this building.

DIVISION OF ANIMAL HUSBANDRY

DOMINION ANIMAL HUSBANDMAN APPOINTED

ON March 24, 1920, Mr. Geo B. Rothwell who has been acting as Chief of the Animal Husbandry Division of the Experimental Farms Branch since the spring of 1919 was promoted to the position of Dominion Animal Husbandman.

Mr. Rothwell was born at Ottawa in 1884, his early training having been received in the Ottawa Public

Schools and Collegiate Institute and on his father's dairy farm near Ottawa. In 1901 he entered the Ontario Agricultural College, taking the agricultural and live stock option, and graduating in 1905. He has been a member of the staff of the Experimental Farm since 1912 when he was appointed Assistant Dominion Animal Husbandman.

GUERNSEY HERD ESTABLISHED AT NAPPAN, N.S.

AT the branch farm at Nappan, N.S., a herd of pure bred Guernsey cows has recently been assembled. Every individual of the herd is an excellent animal and

has been selected from the best herds in the Maritime Provinces and eastern States. Four choice cows with three calves at foot are from the farm of Howard Corning of Yar-

mouth, N.S.; three excellent milkers are from the Stannox Farm, East Holliston, Mass.; while another cow and a promising bull (Senior Calf) of very good breeding are from the Mixer Farms, Hardwick, Mass.

The animals are a uniform lot whose records, pedigrees, and appearance give every promise of exceptional

merit throughout. Most of the animals have records as two-year-olds of over 450 pounds butter fat.

This herd, which was assembled about the middle of March, will be used for experimental purposes and it is hoped that they will do credit to the Guernsey breed in the Maritime Provinces.

THE SHORTHORN HERD AT NAPPAN

THE nucleus of an excellent herd of Shorthorn cattle has been secured for the experimental farm at Nappan, N.S. Six cows and three heifers of good breeding have been secured from the experimental farms at Kentville, N.S., and Fredericton, N.B. and to these are added three young females purchased from J. M. Laird of Prince Edward Island. The herd bull (Lancaster Lord) is a

very promising specimen. He was purchased in March at the sale held in London, Ont.

With the establishment of this herd the Nappan farm is in a position to carry on experiments with Shorthorns for the benefit of the live stock men in the eastern provinces and keen interest in the success of the herd is evidenced by the farmers of the surrounding districts.

THE SHORTHORN HERD AT INDIAN HEAD

BY N. D. MACKENZIE, B.S.A., SUPERINTENDENT

THE foundation of the present herd of Shorthorns on the Experimental Farm at Indian Head was laid in the early days of the Farm, most of the purchases being made in 1890, the original females being of good breeding, mainly of the Enchantress and Wild Eyes families.

The record of the herd shows that the best of the female progeny were retained in the herd which has grown steadily until it now numbers over sixty head of females mostly of breeding age. The herd bulls used have been mainly of Scotch or Scotch-topped breeding and the females are the big roomy easy feeding kind.

Until 1913 the herd was run on the usual lines but since that time by the use of bulls of the Butterfly family the milking qualities of the females have been increased in a very marked degree over that of their dams. One two-year-old heifer has produced over 7,100 pounds of milk during the past year and all the younger cows and heifers show markedly increased production over their dams. By the use of outstanding sires such as recently purchased it should be possible to produce some outstanding individuals and still retain the good milking qualities which the herd already possesses.

SUPERINTENDENT OF INDIAN HEAD EXPERIMENTAL FARM APPOINTED

ON March 23, 1920, Mr. Norman D. Mackenzie who has been acting superintendent of the Experimental Farm, Indian Head, Sask., since May, 1919, was appointed Superintendent.

Mr. MacKenzie was born in 1887, his father being a large dairy farmer

living near Galt, Ontario. He graduated from the Ontario Agricultural College, Guelph, in 1909. He was appointed assistant at the Brandon Experimental Farm on April 1, 1917, and acting superintendent at Indian Head on May 1, 1919.

LIVE STOCK BRANCH

CONDEMNATION TAX ON LIVE STOCK SOLD ON PUBLIC STOCK YARDS

A CONFERENCE was held on March 24th, between the Federal Department of Agriculture and representatives of the meat packing industry of Canada, following which the Minister of Agriculture authorized a ninety-day suspension of the order prohibiting the collection of the Condemnation Tax on live stock sold on public stock yards. In the interval, a com-

mittee with equal representation from producers, Canadian packers and the Federal Department of Agriculture will go fully into the question of condemnation and will endeavour to evolve a constructive policy, the application of which shall be fair to all concerned and, at the same time, effective in steadily reducing disease in Canadian live stock.

SEED BRANCH

AID TO WHEAT PRODUCTION

NEW or improved varieties of wheat are produced by plant breeders attached to Dominion or provincial experiment stations and sometimes by private growers. The most common method is a process of selection from an individual plant of outstanding merit, and the product is generally known as foundation stock seed. This foundation stock seed is multiplied and maintained in its purity by farmers who specialize in seed growing, about three hundred of whom are members of the Canadian Seed Grower's Association. The Seed Branch provides an annual grant of \$7,500 to the C.S.G.A., which obtains revenue also

from inspection fees amounting to 2c. per bushel for registration. The history or pedigree of the seed grown by members of the association is maintained in systematic records and by efficient inspection of both the growing crop and cleaned seed, which is made available in the market as registered seed. In localities well adapted to the production of wheat, growers of registered seed work in co-operation in what is known as a seed centre. Registered or improved seed provides the seed stocks for field crop competitions, seed fairs and provincial seed exhibitions.

The general work of the Seed Branch includes encouragement to wheat production through:—

1. The granting of subventions to field crop competitions, seed fairs and provincial seed exhibitions;
2. Testing seed for farmers and seed merchants;
3. Seed inspection service, including inspection of seed grades for wheat;
4. Seed wheat supply through the Canadian Government Seed Purchasing Commission.

During the past season, subventions amounting to \$6,350 were paid out to provincial Departments of Agriculture on account of 127 field crop competitions in seed wheat. This sum represents approximately one-half of the actual prize money paid out by agricultural societies for the field competitions. These competitions were conducted by provinces as follows: Prince Edward Island, 9; Nova Scotia, 9; New Brunswick, 12; Quebec, 31; Ontario, 43; Manitoba, 17; Saskatchewan, 6. None were held in Alberta and British Columbia. Seed wheat would form an important part of the exhibits in the 153 local seed fairs and 8 provincial seed exhibitions held in Canada last season and supported by Seed Branch grants amounting to over \$10,000. Further financial encouragement is now offered to the formation of seed centres.

Injury to vitality of wheat is more evident than in the case of oats, but where farmers or seed merchants are in doubt samples are sent to the seed laboratories for germination tests. During the year ending June 30, 1919, some 2,500 samples of wheat were tested at the Ottawa, Winnipeg and Calgary laboratories. Farmers are advised both by correspondence and publications as to the improvement of their seed through cleaning and grading.

Seed wheat exposed for sale must comply with Seed Control Act requirements. It must be free from noxious weed seeds or be labelled to indicate those present, and must be capable of germinating 63 per cent or be labelled to show the exact percentage germination. If sold according to seed grades for wheat, the

standards must be maintained for the grades indicated, namely Extra No. 1, No. 1, or No. 2 Seed.

The Canadian Government Seed Purchasing Commission was established in 1916 primarily to provide emergency seed supply for the drought-stricken areas in the prairie provinces, but gradually extended its operations to all Canada. It supplied seed wheat to meet the increased production campaigns which were carried on in all the provinces. The quantity of seed wheat distributed for the 1918 seeding in Eastern Canada from the Canadian Government Elevator at Quebec and direct from the interior terminal elevators amounted to 221,340 bushels, all of which was of superior quality No. 1 Marquis variety. It was sold at the bare cost of the re-cleaned seed, including freight, elevation, cleaning, shrinkage in cleaning, and storage charges. The quantity of seed wheat supplied in western Canada now runs into millions of bushels.

Car samples of wheat in transit to Canadian Government Elevators were sorted out by Dominion Seed Inspectors and those cars which could be cleaned to seed grade without serious dockage were separately binned according to grade. The seed inspectors also supervised the re-cleaning, and issued seed certificates ex-elevator. Every car was sampled for germination tests at Dominion seed laboratories and purity tests were made by the inspectors.

In 1918 the wheat acreage in Canada was increased over the average acreage of the preceding three years by approximately two million acres, and there was a further increase of almost two million acres in 1919. The value in increased wheat production of the specially selected cars of wheat re-cleaned to seed grades and distributed at cost for seeding throughout Canada can scarcely be estimated. The effect of providing a superior supply of seed wheat will result in continuing the demand for only the best quality.

PART II

Provincial Government Departments

SHEEP EXTENSION WORK

The value of good sheep is being emphasized throughout Canada. A number of the provinces have adopted definite policies for the encouragement of pure bred sheep raising. The methods followed include the placing of small grade flocks with young farmers on a share basis, sheep flock competitions, premiums to pure bred rams, organized sheep sales, and co-operative marketing of wool by grade. The ordinary grade sheep is perhaps as valuable in exterminating weeds as is the pure bred but in the production of high class mutton and good quality wool well bred sheep are to be recommended. The articles on the following pages are contributed by officers in the various provinces and they point out the several policies adopted to suit the needs of each particular region.

NOVA SCOTIA

BY DR. M. CUMMING, B.S.A., L.L.D., SECRETARY FOR AGRICULTURE

THE following advertisement which appeared in all of the weekly papers published in Nova Scotia in the fall of 1918, gives some idea of the character of the publicity work, and also an outline of the policy adopted by the Nova Scotia Department of Agriculture, to promote sheep raising in the province:

"Sheep pay best of all live stock in Nova Scotia. High prices for wool and mutton are assured for some years after the war. Now is the time to increase Nova Scotia flocks. Keep your ewe lambs. If you have more than you need, induce your neighbours to purchase them for breeding purposes. Do not sell them to the butcher unless you cannot help it.

"1918 legislation required the compulsory taxation of every dog in Nova Scotia and provided for paying compensation to owners of sheep destroyed by dogs, the owners of which are not known. Now let every farmer, who can help, meet war demands by keeping sheep.

"The Nova Scotia Department of Agriculture in co-operation with the Live Stock Division of the Dominion Department of Agriculture announce the following policies:

1. Several hundred selected grade ewe lambs have been purchased and will be sold at cost to bona fide sheep breeders wishing to secure them.
2. The departments will pay transportation on these ewe lambs from place of purchase to destination.
3. If parties wishing to secure ewe lambs for breeding purposes will write the Nova Scotia Department of Agriculture, Truro, they will get advice relative to price and other particulars. If all lambs already secured are disposed of, an effort will be made to purchase more. Get order in early, as later prices may be higher.
4. The Live Stock Division of the Federal Department of Agriculture will assist as heretofore in

the distribution of pure bred rams.

5. To supplement the distribution of pure bred rams, the provincial Department of Agriculture will secure and ship at cost, high class unregistered ram lambs at slightly higher than butcher prices.
6. Mr. S. A. Logan, in charge of the Sheep Extension Work of the Nova Scotia Department of Agriculture, will, as far as possible, call on parties wishing help with their sheep flocks or requiring further information in regard to the increasing of their flocks."

Anyone reading the successive paragraphs of this advertisement will observe that quite complete arrangements have been made for supporting the development of the sheep industry in the province.

SHEEP PROTECTION LEGISLATION

Special attention is directed to the amended sheep protection legislation, which is of a most drastic character, requiring every dog in the province to be taxed and giving permission to the owners of sheep to shoot dogs at any time during the 24 hours for the slightest provocation to their sheep, and also including provision for paying compensation for sheep that have been destroyed by dogs.

During the fall of 1918, some 250 pure bred rams were purchased and distributed at less than cost throughout the province, but the most encouraging feature which calls for comment is that the farmers themselves have saved ewe lambs to an extent that gives promise of a substantial increase in the sheep population in the province in ensuing years. The Department directly fa-

cilitated the saving of some of these ewes but the far greater part of the work was done by the farmers themselves.

CO-OPERATIVE MARKETING OF WOOL

In addition to the foregoing, the Department has identified itself closely with the work of the Canadian Co-operative Wool Growers Association and by placing one man practically in charge of promoting co-operative marketing of wool and by giving him a number of temporary assistants, the development of co-operative marketing of wool for the year was very marked indeed.

The Department of Agriculture also succeeded in getting outside buyers to come to Nova Scotia when fall lambs were being offered, thus creating a competition for the purchase of lambs, which resulted in raising the prevailing price about 2 cents per pound.

STRONGER ACTION REQUIRED

Despite the number of measures used and the various favourable circumstances, we are bound to state that sheep raising is not yet developed to that extent which we think it should be in the province of Nova Scotia, and to be frank in making this statement, we are bound to state that we are at a loss to know what measures to adopt which will assist in bringing the sheep population of the province of Nova Scotia up to the optimum amount, and we will, therefore, be interested in perusing accounts given by others who have attempted to increase the sheep population in other provinces of Canada and hope, from their experiences to get ideas that may assist a more successful propaganda in this eastern province.

NEW BRUNSWICK

E. P. BRADT, B.S.A., SECRETARY FOR AGRICULTURE

THE policies of the New Brunswick Government for the encouragement of the sheep industry have been progressive. The Hon. J. F. Tweeddale, Minister of Agriculture, introduced an act during the 1918 session of the Legislature providing for the purchase and sale of sheep. A sum not to exceed \$50,000.00 was voted to carry out the provisions of this act. The general system of extending credit to purchasers of sheep, through co-operation with the banks was outlined in the 1918 June number of *The Agricultural Gazette*, page 578. With the assistance of this act over 1,400 breeding sheep were distributed by the Department of Agriculture to the farmers of the province in that year. In addition to this the general campaign for the promotion of the sheep industry, launched at that time and pushed vigorously ever since, resulted in many private sales of which we have no definite record. Again a large number of farmers instead of marketing their ewe lambs retained them for breeding purposes. An indication of how generally this must have taken place in 1917 and 1918 is shown by the Live Stock Statistics. In 1917 there were approximately 140,000 sheep in the province while the 1919 statistics show a sheep population of 212,745.

The co-operative marketing of wool through the Canadian Co-operative Wool Growers, Limited has received considerable attention by the Department. In 1918 approximately 32,000 pounds were marketed through this association. In 1919 there was an increase to 68,000 pounds. With the popularity this system of marketing now enjoys there is little doubt but that 100,000 pounds will be marketed under this system in 1920.

During the summer of 1919 the province took another advanced step in encouraging the sheep industry

and inaugurated a system of visiting the pure bred breeders and grading all the pure bred rams for sale in the province. We had the co-operation of the Dominion Live Stock Branch in this work. Professor Sackville of the Ontario Agricultural College did the grading work in a highly satisfactory manner. The rams were graded into three classes XXX representing the superior, XX the average, and X the common ram.

A definition of the grades was as follows:

XXX The outstanding characteristics of this class are: trueness to breed type, correct conformation, size and superior quality of wool for the breed. They are rams of the highest quality and represent the selects of each flock and can be highly recommended as very suitable stud sheep for pure bred flocks.

XX Rams are the second grade. They are good, growthy rams, with fair type, and can be recommended to the man wishing to improve his grade flock.

X Rams are off type and under-size and can not be recommended for breeding purposes. Hence they have not been recorded in this list of rams for sale.

The grade was marked with a punch in the ear of the ram. The pure bred breeder was given a cash bonus of \$3.00 on each XXX ram and \$2.00 on the XX ram. The X ram did not receive a bonus nor was it listed for sale in the list prepared by the Department. The premium on these rams, while not large, was meant as an encouragement to the breeder and an inducement to give even more attention to the quality of the ram being used as a flock header. By paying a little more and using greater care in selection of his ram, he would be likely to get a larger percentage of his ram lambs in the higher grades.

The number of rams for sale in the different grades together with the price asked for each was listed by the Department. Copies of this list were sent to all the agricultural societies in the province and to a

mailing list of over five hundred sheep owners.

Our information is that pure bred breeders never before found it as easy to market their rams. In this way it opened up a market for our local breeders. It also protected the man purchasing because he could be sure of getting a ram up to the standard of the grade selected. His purchase could be done by correspondence quite satisfactorily if he found it impossible to make the selection in person. The whole plan met with marked success and will be continued next year with some slight changes.

The New Brunswick Department of Agriculture supplemented the cash bonus given by the Dominion Live Stock Branch to the man who had never used a pure bred ram before, to the extent of five dollars, payable the first year. This co-operation induced many more farmers to take advantage of this policy. Approximately one hundred farmers secured a pure bred ram for the first time under this plan. This cannot help but work toward an improvement

in the quality of the lamb crop going on the market from this province next year.

A series of dipping, docking, shearing, and castrating demonstrations were arranged and held at a number of points in each county in the province. This work proved of great value. At marketing time it was noticed that a much larger percentage than usual of the ram lambs going on the market had been castrated and as a result sold to better advantage. These demonstrations will be continued during the coming summer.

The agricultural representatives of the Department co-operated with J.H. King of the Dominion Live Stock Branch in encouraging co-operative shipment of lambs to Montreal during the fall of 1919. From only a small section of the province, where this work was carried on, some eighteen car-loads of lambs were shipped out as co-operative shipments. Farmers were able to net from \$2.00 to \$3.00 per cwt. more for their lambs than they had been offered locally by private dealers.

QUEBEC

BY X. N. RODRIGUE, B.S.A.

WITH the praiseworthy object of making sheep breeding a more profitable industry in the province of Quebec and of encouraging the breeders to keep better and more breeding stock, the Quebec Department of Agriculture grants to all farmers' clubs maintaining (during at least nine months) a pure bred ram, eminently desirable for breeding and of a breed suitable to the locality, a bonus of \$15.

With the further object of encouraging the growth of the industry, in those parts of the province offering the most favourable conditions, the Department of Agriculture has established, in various places, demonstra-

tion flocks, make up of pure bred animals of the most suitable and the most profitable breeds for the farmer, due regard being given to the climatic conditions and the nature of the ground.

Demonstrations in dipping, shearing and castrating are given to the farmers in charge of the flocks, and for the benefit of breeders making a special request to this effect. As farmers often complain of losses caused by stray dogs, a law has been passed by the Department of Agriculture providing for the protection of sheep against dogs and much good has resulted so far from its application.

Much progress has been made in the wool industry during the last few years, owing to the good work of the local Wool Growers' Co-operative Associations, all of which are affiliated with the Canadian Co-operative Wool Growers' Association, Ltd. These local associations are found in several important centres of the province. Wool sold through them is graded

and paid according to its value, thus bringing a fairly good revenue to the farmer and stimulating sheep breeding. It is to be hoped that farmers will give more attention to the sheep industry in the future and that, realizing its value, they will co-operate with the Department of Agriculture in an effort to generalize and improve sheep breeding.

ONTARIO

BY J. E. RETTIE B.S.A. ASSISTANT DIRECTOR

THE extension work being carried on by the Ontario Department of Agriculture with sheep is divided into three divisions;

1. Placing small grade flocks with young farmers on a share basis.
2. Sheep flock competition.
3. Co-operative marketing of wool by grade.

The first is handled entirely by the Live Stock Branch of the Department and the two latter are handled in co-operation with the Ontario Sheep Breeders' Association.

FLOCKS PLACED ON SHARE BASIS

Up to the present twenty-three flocks have been placed with young farmers in the province on a share basis. These young men are selected by the agricultural representatives in their counties on account of having taken particular interest in sheep at the short courses and are all boys who have not kept sheep before. The majority of these flocks were placed in the fall of 1917 although a few have been placed since. The general conditions were that the Department would furnish a flock of five females already bred the first year, and that in the fall of the second year the Department would furnish a ram unless the holder could make other satisfactory arrangements.

This ram was to be kept by the holder of the flock till August of the following year when he could either be purchased by him or disposed of according to instructions received from the Live Stock Branch. From that time forward the holder of the flock was to provide a pure bred ram at his own expense. The returns of sheep to the Department were to be made as follows for a flock placed in the fall of 1917:

2—one or two shear ewes in October 1919,

2—one or two shear ewes in October 1920,

2—one or two shear ewes in October 1921,

after which returns the flock holder will have full title to the flock.

The holder of the flock also agreed to dip them at least once a year, to dock all lambs and castrate all grade male lambs.

It was intended to utilize the sheep returned from these flocks in placing other flocks on a similar basis. It has been found, however, that many of these young men wish to increase the size of their flock and in most cases they have asked the Department to place a value on sheep to be returned and have purchased them instead of returning them. While this has not made it possible to increase the number of flocks to the

extent it was originally expected it would be done, it indicates that the majority of those who receive flocks are in the sheep business for good and are anxious to increase the size of their flock and we have undoubtedly increased the number of satisfied sheep raisers in the province.

SHEEP FLOCK COMPETITION

In 1919 prizes were offered to keepers of flocks of sheep in eleven districts in the province. These flocks might be either pure-bred or grade. If a man with a grade flock gave his sheep proper care and attention, he had as good a chance of winning a prize as one with a pure-bred flock. There were three points which were made absolutely essential to a winner of a prize;

- 1 All lambs must be docked.
- 2 All grade male lambs must be castrated.
- 3 The sire in use in the flock must be pure-bred.

In the accompanying column is the score card used in scoring the flocks entered in this competition.

CO-OPERATIVE WOOL MARKETING

The Ontario Sheep Breeders' Association during the season of 1917 began the collecting and grading of wool in Ontario. This work has been continued during the seasons of 1918 and 1919, with great success. The table on following page, shows the amounts per grade handled during the past three seasons, together with the prices obtained for each grade.

	Possible Score..	Judge's Score.
Health of flock— Note any sign of disease or general lack of thrift	10	
Dipping— Its efficiency is indicated by presence or absence of parasites and condition of skin.....	10	
Docking— All lambs should be docked, or the judge should show the owner how to do it. If owner is not willing to have lambs docked he cannot receive a prize.....	10	
Castrating— All male lambs in grade flocks should be castrated, or the judge should show the owner how to do it. Any owner not willing to have his lambs castrated cannot win a prize.....	10	
Winter care—considering housing and condition of flock.....	10	
Lamb crop, considering— (a) Number of lambs. Full marks should not be given unless the flock has produced at least one lamb per ewe on the average.....	10	
(b) Condition— Size and condition of lambs, but number of marks awarded for condition should not be more than given for number of lambs..	10	
Type of ram— He should be a good individual of the breed and pure bred in every case. Flocks using grade sires cannot receive a prize.....	20	
Condition of wool— To be decided by grading when wool is shipped to Guelph.....	10	
Total.....	100	

Grade	Number of pounds handled			S. P. per lb. in		
	1917	1918	1919	1917	1918	1919
Fine Staple.....		740			75	
Fine Medium Staple.....		807			76	
Medium Staple.....		281			73	
Fine Combing.....			385			70
Fine Clothing.....		573	222		70	64
Fine Medium Combing.....	3,461	8,102	7,492	67	76 1/2	67
Fine Medium Clothing.....		979	6,581		70	62
Medium Combing.....	82,241	129,518	204,519	66	76 1/2	67
Medium Clothing.....	7,184	24,678	18,173	67	73, 1/2	62
Low Medium Clothing.....	64,636	228,281	256,620	63 3/8	73 1/2	60
Low Combing.....		169,297	96,429		67	52
Lustre Combing.....	4,480			57		
Coarse.....	93,444	104,820	113,748	57	60 3/8	45
Rejects—						
Burry and Seedy.....		15,812	13,338		42	40
Cotts.....	8,735	26,724	22,851	50	50	35
Dead.....		5,197	4,715		50	45
Gray and Black.....	1,351	4,401	3,823	46	41	40
Locks and Pieces.....	604	163		34		
Washed Wool, Fine.....		7,766	3,848		95	82
Washed Wool, Coarse.....			2,790	78	85	65
Tub Washed Wool.....		1,300			90	
Tags.....	4,886	18,769	18,343	26	162	15
Mohair.....		29	13			40
Sisal.....			1,388			52
Miscellaneous.....			138			
Total pounds.....	271,122	748,237	775,316			

MANITOBA

BY H. H. MCINTYRE, LIVE STOCK SPECIALIST

THE Extension Service Branch of the Department of Agriculture is doing some work in the development of the sheep industry through boys' and girls' clubs. The banks have shown a readiness to finance the purchase of live stock under plans submitted by the Extension Service. By this means during the last two years a large number of boys and girls have, by borrowing money from the banks, purchased two or more ewes. The ewes are selected by officials of the Department, and are for the most part high grades. A few of the boys and girls have expressed a desire to begin with pure breeds and these have been supplied. Arrangements are made whereby the Department supplies pure bred rams when none are available in the districts where the boys and girls reside. Present indications are that this will prove a great factor in the extension of the sheep industry.

Under the Live Stock Purchase and Sales Act, enacted in 1919, farmers are able to procure breeding ewes through the Department on the basis of one third cash, the balance to be loaned by the Department at the rate of 7 per cent. A number of flocks of varying size have been started as a result of this legislation.

The same Act makes similar provision for the supplying of pure bred sires on the basis of one half cash.

Legislation for the protection of sheep against dogs has been on the Statute Books since 1917. The substance of the Act is contained in sections 3 and 4 which read as follows:

3. Any person may kill any dog which he sees pursuing or wounding any sheep.

4. The owner or occupant of a farm, or his servant, or any member of his family, who finds a dog without lawful permission in any field on such farm, giving tongue and terri-

fying any sheep on such farm, may kill such dog.

Provision is also made in the Act for the recovery of damages to sheep by dogs.

The gospel of more sheep is preached at every opportunity through the

media of bulletins prepared by the animal husbandry department of the Agricultural College, the publications branch, and at the meetings held under the auspices of the Extension Service.

SASKATCHEWAN

BY J. G. ROBERTSON, LIVE STOCK COMMISSIONER

WORK for the encouragement of sheep breeding is carried on in Saskatchewan by provincial authorities under three heads—by the College of Agriculture, by the Co-operative Branch of the Department of Agriculture, and by the Live Stock Branch of the Department of Agriculture, Regina.

The College of Agriculture is doing considerable experimental work in their college flock, particularly in demonstrating how improved flocks can be graded up by starting in with common ordinary range ewes. Some very striking results have been obtained, and the people of the province have been informed of the results through the various courses at the University, through demonstrations carried on by better farming trains, and through the work of the Extension Department. They have demonstrated what remarkable increases in the size of the animal, in the quality of the mutton, and in the quantity of the wool can be obtained by using pure bred rams on the above mentioned range ewe.

The Live Stock Branch continues to work up on this stage, and assists farmers who are ready and willing to engage in sheep raising to secure foundation flocks. Farmers can secure ewes through the Live Stock Branch on credit terms. Grade sheep are purchased by the thousands, and sold out in small lots of twenty-five, fifty, or one hundred head to individual farmers. At the same time it is usually arranged to sell the farmer a pure bred ram on credit terms. This work has been carried on for a number of years, and has grown from year to year. For example, in 1914 four hundred and eighty-

two grade ewes were supplied to farmers, while in 1918 three thousand nine hundred and seventy-six were supplied. Thirteen pure bred rams were supplied in 1914, while in 1918 one hundred and twenty-seven were supplied. The pursuance of this policy is having a very marked effect on the improvement of the sheep of the province, and is much appreciated by farmers who are endeavouring to start into the sheep business.

Valuable work in connection with the marketing of wool is performed by the Co-operative Branch of the Department. This Branch acts as a wool marketing agency for the sheepmen of the province, and has developed to a very marked extent. At the time the work was undertaken it was felt by many of the sheepmen that they were not getting a fair price for their wool, that is, that the wool buyers were making far too large a profit at the expense of the grower. This work is now being done by the Department of Agriculture, not only without profit to themselves, but without cost to the sheepmen, therefore no such idea prevails at present. As evidence of the growth of the work a table issued by the Department shows that in 1914 one hundred and seventy-nine consignments of wool weighing sixty-nine thousand four hundred and four pounds was sold through the Co-operative Branch for which the average price realized was seventeen and three-quarter cents, while in 1918 nine hundred and sixteen consignments weighing three hundred and ninety-four thousand and sixty-eight pounds was sold at an average price of sixty-one and one-half cents per pound. For the past two years this

wool has been consigned to the Canadian Co-operative Wool Growers Limited, of Toronto, Ontario.

In addition to the official work as above outlined the Saskatchewan Sheep Breeders' Association under the presidency of a prominent sheep breeder, and of which J. G. Robertson, the Live Stock Commissioner is secretary, does much valuable work by conducting pure bred ram and ewe sales at both Regina and Saskatoon in the fall of each year. These sales have been growing in volume and importance each year, and the sale conducted in Regina last autumn was the most successful sheep sale in Canada during the year. The Sheep Breeders' Association also carries various brands of sheep dipping powders and fluids, for the benefit of its members, which

are handled practically at cost, and it makes arrangements through the secretary for the hiring of sheep shearers, who travel around at sheep shearing time shearing sheep at so much per fleece. The price last year was 15 cents per fleece. This arrangement is of very great assistance, particularly to the new breeders who have not had any experience in the shearing and handling of the fleeces.

Taken all in all the prospects of sheep breeding in the province seems bright, and the work done by the Agricultural College, by the Department of Agriculture, and by the Sheep Breeders' Association will bear fruit in a marked increase in the sheep of the province within the next few years.

ALBERTA

BY JAMES MCCAIG, PUBLICITY COMMISSIONER

DURING the war the Department of Agriculture in common with the Dominion and other provincial Departments of Agriculture gave emphasis to the need of producing the largest possible amount of animal products. The chief need was for pork. The greatest emphasis was put on pork production, and sheep were not specially emphasized. As a matter of fact, some of the educational work of the department represented in short course schools and live stock demonstration work was interrupted during the war and sheep did not come in for very great attention. They have, however, been rather strongly on the increase in the province during the past two or three years on account of the very high price of wool and on account of the fact that the meat product from sheep, that is, lamb, has held up during the past five years to the price of the best beef and, good profits have been made out of sheep every year.

Ordinary commercial farm ewes during the past five years have yielded their own value, that is,

from fourteen to twenty dollars each year in wool and mutton together. This condition together with the flattening of prices for pork by about 25 per cent has turned a good many people toward sheep-keeping, and in the grain growing areas of the south a good many people are introducing bands of small stock for the profit to be secured from using up rough grains and fodders and also for the keeping of the land clean. Recently the department through one of its representatives put on a special campaign to promote sheep-keeping along the important centres of the Goose Lake line east of Calgary and this is expected to have important results. The department is not conducting special experiments in sheep-keeping beyond supporting good farm flocks of Oxford and Shropshires on the demonstration farms.

In sympathy, however, with the tendency of the farmers themselves to market to the best advantage the department is giving full encouragement to sheep sales in the large centres of Alberta. Under the aus-

pices of the breed associations, which are liberally supported by the department, large pure bred sales of rams particularly but also of ewes, are held each year at Calgary and Edmonton and a good sale is held at Lacombe supported wholly by

the local Wool Growers' Association themselves.

The business side of the stock raisers' interests is the side which is receiving most encouragement at present.

WHEAT PRODUCTION

Owing to Canada's geographic position and the climatic differences in the various provinces it appears that no one variety of either fall or spring wheat gives uniform results throughout the Dominion. Each province therefore, by breeding and selection, is endeavouring to secure varieties of wheat which will give optimum results to the grower and will have satisfactory milling qualities. The improvement of the wheat crop is encouraged by the federal and provincial departments of agriculture, by the Canadian Seed Growers' Association, and by private individuals.

The following articles are from the provinces while the work of the Dominion Department is outlined in Part I, and that of the Canadian Seed Growers' Association appears in Part IV of this issue.

NOVA SCOTIA

BY DR. M. CUMMING, SECRETARY FOR AGRICULTURE

WHATEVER work has been conducted in the way of improving of varieties of wheat in the province of Nova Scotia has been conducted by the Dominion Experimental Farms system. The efforts of the provincial Department have been confined entirely to the distribution of good seed and to the encouragement of farmers to grow a larger acreage of wheat.

The varieties of wheat most commonly grown in Nova Scotia are White Russian, Red Fife, and smaller quantities of White Fife, Marquis, etc. White Russian is the favorite variety being regarded as a hardy wheat and a heavy cropper but having the objection of being a soft wheat that yields less flour per bushel than some of the harder wheats.

There is a very popular strain of Red Fife wheat which is supposed to have been developed from the original Red Fife by a Mr. MacKay living near the town of Pictou. This particular strain is generally considered to be a little more prolific and somewhat hardier than the ordinary Red Fife and the variety has been

propagated quite extensively throughout the whole province.

During the progress of the war the provincial Department of Agriculture endeavoured to stimulate wheat growing by the adoption of the following measures:

1. Financial assistance in the erection of modern roller process wheat mills.

Under this policy eleven new roller process wheat mills were erected at strategical points and provided farmers with the necessary means of getting their wheat milled.

2. Large quantities of pure varieties of seed wheat were distributed at cost.

In those years when good wheat was available within the province a considerable share of this wheat was bought from local growers with a view to maintaining the advantage which accrues from the use of home grown seed. In other years the seed was imported from the west and other Canadian points.

As a result of these policies together with literature issued and advice given from the platform, the acreage devoted to wheat in the province of

Nova Scotia was considerably more than doubled during the progress of the war. However, in 1919, the year immediately succeeding the signing of the armistice the increased acreage had already commenced to dwindle. Whether this dwindling will continue or not we cannot at this time state.

In the main, Nova Scotia farmers can grow more feed stuff in the form of oats than in the form of wheat,

which means that if wheat production is substantially increased in those areas of the world which are better adapted for this crop than eastern Canada, it is altogether likely that the wheat acreage of Nova Scotia may go back to about the pre-war figures and that the land formerly devoted to the growing of wheat will be devoted to oats and other feed crops for which the general, climatic, and soil conditions of the province of Nova Scotia are better adapted.

NEW BRUNSWICK

BY O. C. HICKS, B.S.A., INSTRUCTOR OF SOILS AND CROPS

SUCCESSIVE provincial governments have supported a policy of encouragement to the wheat growing industry by giving a cash bonus toward the cost of erecting and equipping wheat-mills of the Hungarian type, by the periodical importation of high class seed, to be sold to farmers at cost, and by holding standing field crop contests and seed fairs in co-operation with the federal Seed Branch for the production and dissemination of wheat of superior merit.

The Special Production Effort for greater wheat production in the years 1917 and 1918 involved the importation of seed in much larger quantities than ever before. Correspondingly larger crops were harvested in those years than previously. The acreage sown to wheat in 1918 was 49,453; in 1917, 15,331 acres; while the average acreage for the preceding three year period was 13,210.

Many new mills were required to effect the self-sufficing stage in supplying the home flour trade. To these the government extended assistance by a cash bonus of two thousand dollars to those whose rated capacity in barrels of flour each 24 hours was 50 barrels or over, and one thousand dollars to those less than 50 barrels. Previously the amount of the bonus was one thousand dollars towards a

mill of the 50 barrel size and five hundred to one of the 25 barrel size.

There are now in operation in the province thirty-four roller process mills, six of which have been erected during the war period.

Since no model, demonstration or experimental station is conducted by the provincial government its policy has been to supply improved seed of suitable varieties from outside sources. These importations, made at various times, consisted of the standard varieties White Russian and White Fife. This seed formed the foundation stock of members of the Canadian Seed Growers' Association. This association has the sympathetic support of the Department of Agriculture. Members of the Canadian Seed Growers' Association have continued the selective processes recommended by the association and at least two improved strains of the White Fife have been evolved, viz. White Fife (Donald Innis, Tobique River) and White Fife (R.B. Crewdson, Burden). These strains were carried by Professor L. S. Klinck in the cereal breeding plots at MacDonald College, Quebec, for a number of years.

Though, generally speaking, it is conceded that a humid climate is unfavourable to wheat growing some

large yields of excellent quality have been recorded. Last season in Kent county a yield of 225 bushels of the

White Fife variety was harvested from four acres, an average of 56 bushels per acre.

ONTARIO

PROF. C. A. ZAVITZ, B.S.A., D.A.SC., ONTARIO AGRICULTURAL COLLEGE, GUELPH

ACCORDING to the full statistics of past years of the Ontario Department of Agriculture, 71 per cent of the wheat lands of the province have been used for winter varieties and 29 per cent for spring varieties. This relationship, however, has been changed considerably during the last two years owing to unfavorable seasonal conditions for winter wheat and exceptionally good conditions for the spring varieties. Ontario is particularly well adapted to the production of large yielding varieties of white winter wheat. In some seasons spring wheats of the Marquis and Red Fife varieties give good yields of wheat of fairly good quality. Owing to abnormal conditions in 1917 many car loads of Marquis spring wheat were imported from the Western Provinces and in 1918 a number of car loads of the No. 6 white winter wheat were imported from New York State for seed purposes in Ontario. Under average conditions winter wheat yields 21.4 bushels and spring wheat 16.3 bushels per acre in this province. The general area used for wheat in Ontario is approximately one million acres.

Many experiments have been conducted at the Ontario Agricultural College in testing varieties, selection of seed, dates of sowing, quantities of seed per acre, preparation of the land, use of manures and fertilizers, etc., in order to secure results of real service to the farmers of the province. These results have been published in bulletins, circulars and newspaper articles.

The Dawson's Golden Chaff variety of winter wheat has been the outstanding variety with Ontario farmers for many years past. It



SHEAF OF WHEAT O.A.C. NO. 104

is still the most extensively grown variety of winter wheat in the province. It was originated in Ontario thirty-nine years ago. It produces a very stiff straw of medium length, beardless heads with red chaff and white grain which weighs about the standard per measured bushel. The Dawson's Golden Chaff is a heavy yielder but the grain is rather soft and is more suitable for the production of pastry and of breakfast foods than for the manufacture of bread.

With the object of originating better varieties than those already in cultivation crosses have been made at the Ontario Agricultural College

between the Dawson's Golden Chaff and some of the varieties of particularly high quality for bread production such as Tasmania Red, Crimean Red, Turkey Red, Buda Pesth, Bulgarian and Imperial Amber. A cross made between the Dawson's Golden Chaff and the Bulgarian has furnished a new variety which has been named the O. A. C. No. 104 and which has given particularly good results both at the College and throughout Ontario. The following gives the average results at the College of the O. A. C. No. 104 in comparison with each of its parents for a period of nine years:



O. A. C. NO. 104 WITH ITS TWO PARENTS

Varieties	Average of Nine Years' Results		
	Weight per Measured Bushel (pounds)	Yield per Acre	
		Straw (tons)	Grain (bush).
O. A. C. No. 104.....	59.1	2.69	47.6
Dawson's Golden Chaff.....	59.0	2.37	44.6
Bulgarian.....	59.3	2.55	39.4

Not only has the O. A. C. No. 104 proven to be a large yielder per acre but it is a vigorous grower and has shown itself to be more hardy than either of its parents. It is a white wheat with a white chaff and beardless head.

Five varieties of winter wheat have been distributed in each of the past three years for the co-operative experiments throughout Ontario. The following table gives the average yield of grain per acre of each of these varieties for each of the three years and for the whole period:

Varieties	Yield of Grain per Acre (bushels by weight)			
	1917	1918	1919	Average 3 years 71 tests.
O. A. C. No. 104.....	23.7	25.5	28.9	26.0
Imperial Amber.....	22.9	23.0	28.2	24.7
Dawson's Golden Chaff.....	21.5	25.3	27.0	24.6
Yaroslaw.....	17.6	21.5	23.4	20.8
Kharkov.....	19.3	19.2	23.5	20.7

It will be seen that the O. A. C. No. 104 variety of winter wheat gave the highest average yield per acre in the co-operative experiments in each of the past three years, the average being from 1.3 to 1.4 bushels per acre more than that of the Imperial Amber or the Dawson's Golden Chaff. It will, therefore, be seen that the O. A. C. No. 104 has proven more productive than the Dawson's Golden Chaff both in the experiments

at the college and in the co-operative tests throughout the province.

For fuller information regarding results of experiments with wheat in Ontario the reader is referred to Bulletin No. 265 on "Wheat and Rye" and to Bulletin No. 268 on "Farm Crops" both of which were prepared in the Department of Field Husbandry at the Ontario Agricultural College, and are obtainable from the Ontario Department of Agriculture, Parliament Bldgs., Toronto.

MANITOBA

BY T. H. HARRISON, B.S.A., PROFESSOR OF FIELD HUSBANDRY

THE work in wheat improvement at the Manitoba Agricultural College was started in 1916 and consequently no striking results have yet been obtained. It has been largely of a preparatory nature and may be classified as follows:

1. Introduction of new strains and varieties.
2. Variety tests.
3. Hybridization.
4. Selections (pure lines).
5. Propagation of pure lines for distribution.

The object of the wheat improvement project is first to obtain strains of wheat that will retain the high milling quality of Marquis and Red Fife and yield well in the Southwest under dry land conditions, in the East under rust conditions and in the North under short season conditions; second, to propagate pure line selections and thus become one of the sources of elite stock seed for the province.

With the first object in mind, introductions have been made from

Denmark, Sweden, New Zealand, Australia, and United States. From these introductions some promising strains have been secured and will be tested out more thoroughly in the variety test plots. While many of them will not prove of sufficient merit to be introduced on the farms of the province, they will be of great value in future breeding work.

The variety tests have been conducted along the usual line as a preliminary step to improvement. Over 75 common and introduced varieties of wheat have been tested during the past three years. In addition to these, over 300 special selections have been tried out.

In 1916 about 250 selections were made from the common varieties, one selection from Red Fife and two from Marquis have shown superior qualities and are being propagated. A number of the selections have also been made

from material that has been introduced some of which promise to give strains of value for certain portions of Manitoba.

Pure line strains of the approved varieties will be increased on the college farm. The field husbandry Department will sell this seed to credited seed growers and the provincial demonstration farms. The crop will be inspected in the field by a representative of the Department and when threshed will be re-purchased by the Department at a stated premium over market wheat. This seed will then be cleaned and in turn sold to one or two good growers in each agricultural society. The grain would be again inspected in the fields, the seed cleaned through one of the local cleaning plants and sold to farmers in that locality through the agricultural society. By this scheme good seed would be available in every corner of the province inside of five years.

NOVA SCOTIA

AGRICULTURAL ACTIVITIES

BY J. G. ARCHIBALD, B.S.A.

THIS province has adopted in a practical way, the recommendation made at the conference of Deputy Ministers at Ottawa during the first week of March, with respect to co-operation in experimental work.

For the first time in the history of agricultural experimental work in Nova Scotia, federal and provincial men met on March 30 and discussed lines of experimental work to be conducted this coming season at the federal and provincial experiment stations. The Dominion officials present at this first conference were:

Dr. M. O. Malte, Dominion Agrostologist; W. S. Blair, Superintendent, Dominion Experimental Station, Kentville, N.S.; Wiley W. Baird,

Superintendent, Dominion Experimental Farm, Nappan, N.S.

Provincial officials were: Prof. J. M. Trueman Agriculturist, N.S. Agricultural College; Prof. H. S. Cunningham, in care of experimental plots at N.S. Agricultural College; Dr. M. Cumming, Provincial Secretary for Agriculture.

SCRUB BULL LEGISLATION

At the 1919 session of the provincial legislature, legislation was enacted to control the scrub bull nuisance throughout the province, the essence of which is that it is illegal to offer a scrub bull for service or to allow him to run at large in the bounds of an agricultural society, when such bounds have

been regularly established and approved by the Governor in Council.

An amendment is now before the provincial House of Assembly which aims at making this law applicable also to areas in which Dominion Live Stock Improvement Associations are existent. This amendment is likely to pass the legislature.

There being some 275 agricultural societies in Nova Scotia and quite a large number of Dominion Live Stock Improvement Associations, the ostracizing of scrub bulls from such areas should result in a material reduction of their numbers.

NEW SEED GRAIN REGULATIONS

Prize lists for the field crops competition have just been published. Upwards of \$3,000 is offered in prizes. There are some new regulations this year, the most important of which is that no field will be admitted for competition unless seeded with,—

- (a) registered seed, or
- (b) seed approved by the Nova Scotia Department of Agriculture. Such seed must be from fields that have been at least two years in the field crops competitions, and have

scored 95 per cent. (19 out of 20 points) for purity. Provision has also been made for a special competition in which prizes will be given half on the basis of the standing crop and half on the basis of the total threshed grain, which, when cleaned, must be offered for sale for seeding purposes.

Both of these new features were adopted on the recommendation of the Dominion Seed Commissioner, with the hearty approval of the provincial officials. It is anticipated that because of this new regulation, there will be a considerable reduction in the number of entries, but it will ultimately lead to much better results in supplying a substantial quantity of home grown seed for Nova Scotian farmers.

CLYDESDALE STALLION PURCHASED

The Agricultural College has recently purchased from John A. Boag, Queenstown, Ontario, the two-year old imported Clydesdale stallion, Premier Fashion. This horse is an animal of considerable promise, showing a high degree of quality. His pedigree on both sides runs back to Baron's Pride.

QUEBEC

POULTRY JUDGING CONTESTS AT THE OKA AGRICULTURAL INSTITUTE

BY BRO. YVES, LECTURER

POULTRY judging forms a necessary part of a poultry course.

A series of technical lessons attracting a great deal of interest is given each year on the subject in our Colleges of Agriculture.

In order to complete the teaching, to initiate the pupils in the art of poultry judging and to train efficient judges for our provincial fairs, a special judging contest is held every three years by the Oka Agricultural Institute, and as many varieties of

fowls as can be got together are submitted to the examination of the pupils.

Under present conditions, the schools of agriculture could not possibly keep all the varieties of fowls, not even the leading ones, of general utility; too much space would be required and it would be too costly. A knowledge of all the different characteristics of the various breeds is not necessary in poultry keeping,

but such knowledge is however essential for those who desire to specialize in the industry, as they must know the different breeds, if they wish to be able to judge them when occasion requires.

A way to solve the difficulty has been devised by the Oka Agricultural Institute. Pupils are invited to prepare, at regular intervals, for a special judging contest. Almost all breeds of fowls that they may be

is like an amphitheatre, is admirably suited for an exhibition of this kind.

The first day was reserved exclusively for the work of the competitors, and during the next two days, the institute instructors in poultry husbandry, Brother Wilfrid and M.G. Matte, scored the judging work of each.

Special encouragement was given by the Department of Agriculture and the Poultry Branch of the Quebec



POULTRY BUILDING AT OKA AGRICULTURAL INSTITUTE: JUDGING CLASS
AND PEN OF BIRDS IN THE FOREGROUND

called upon to judge some day are placed at their disposal by obliging breeders, devoted to poultry interests.

The first contest was held on March 25, 26, and 27. There were about fifty contestants, who had prepared for the occasion by two month's study.

Seventy-eight specimens representing thirty varieties of fowls were exhibited in the new demonstration pavilion, inaugurated by this contest. This building, the interior of which

Farmers' Experimental Union. More than 60 prizes were given to the successful competitors.

The competition included two distinct phases: Individual judging of specimens and judging the laying capacity by the "Hogan Test." In the first contest, Mr. Odilon Brun, and in the second, Mr. L. Poissant came out first, with first class honours.

In addition to the Rhode Islands, Plymouth Rocks, Wyandottes, Orpingtons, Chanteclers, Black Minor-

cas, Leghorns, there were also the Brahmas, Langshans, Dorkings, Hamburgs, Cornwalls, Bantams, Sebrights, Cochins, Silkies, etc., the

latter being supplied by Mr. G. Brown, of Pointe-Fortune, who had already supplied the majority of the breeds in previous contests.

SPECIAL COMPETITIONS OF STANDING FIELD CROPS AND THRESHED GRAIN

BY JULES SIMARD, B.S.A., SEED BRANCH REPRESENTATIVE, QUEBEC

THERE was organized in 1912, in the province of Quebec, 59 standing crop competitions and 8 seed fairs. This year there were 174 crop competitions in which nearly 3,000 farmers took part, and 75 seed fairs averaging 55 exhibits. According to the reports from the judges the grain exhibited at those fairs was, with very few exceptions, of good quality. In fact, a large number of our farmers will, for that purpose, select their exhibits of grain by hand.

These results are given to show that this work has progressed considerably and if no very marked improvement has been made in getting the farmer to sow better seed on his farm, it is not due to neglect but rather to the method adopted to bring about the results sought.

OBJECTIONS TO OLD SYSTEM

The main objection against the old system was the absolute lack of control over the competitor in both the standing field crop competition and seed fair. In other words there may have been a successful field competition and seed fair in a county, and a farmer may have taken part and won prizes in both, and still sow very poor seed on his farm.

A large amount of the government money went to the professional exhibitor who would work, not to improve his crop, but to win a prize and fool the judge at the fair. In order to obtain this result, he may select a small quantity of grain by hand which he will bring for two or three years in succession to the seed

fair, or buy from his neighbour or some other farmer an extra good bag of grain, bring that to the fair and get the best prize that is offered.

The judge may give a prize to a sample of grain which is poor in germination, with the result that the exhibitor will make use of that to sell his grain or sow it himself and make a failure of his crop.

So, while this system of improving seed by competitions and seed fairs has done considerable in the way of educating and spreading information to the farmers, it has not obtained the results desired, namely, that of making the average farmer sow better seed on his farm.

THE NEW METHOD

After consulting the Seed Commissioner and the Deputy Minister of Agriculture for Quebec, competitions of threshed grain instead of seed fairs, were undertaken last season as an experiment. Two of these were organized; one in Rimouski and the other in Champlain county. In Rimouski there were 58 competitors and in Champlain 45. The system consists of judging the grain in the field, the same as was done before, and judging the threshed grain again at the farmer's premises in the winter, the awards being given on the combined results.

We had for our experiment in Rimouski, competitions in oats, wheat, clover and potatoes; and in Champlain, oats, wheat, potatoes, clover, and timothy. The threshed grain was judged with score cards and the judge was required to take

from each lot a sample large enough to allow fair analysis for a purity and germination test.

The rules to which the competitor had to adhere were as follows:

The field crop competition must be organized and held in accordance with instructions given in the circular letters dated Dec. 26, 1918, and January 27, 1919.

The judges will examine the grain on the field at harvest time in order to establish the standing of each competitor, using the official scale of points. At the time of the inspection of threshed grain, the grain will be scored again and the prizes given to the competitors by the Department will be based on the average number of points granted to each competitor. Eleven prizes, making a total sum of \$90 will be distributed for each variety, providing that there are at least fifteen competitors. The prizes will be as follows:

1st prize	..\$15.00	7th prize	..\$7.00
2nd "	.. 14.00	8th "	.. 6.00
3rd "	.. 12.00	9th "	.. 4.00
4th "	.. 10.00	10th "	.. 3.00
5th "	.. 9.00	11th "	.. 2.00
6th "	.. 8.00		

If the competitors are less than fifteen and more than ten for one variety, there will be nine prizes, making a total of \$70 as follows:

1st prize	...\$13.00	6th prize	..\$7.00
2nd "	.. 11.00	7th "	.. 6.00
3rd "	.. 10.00	8th "	.. 4.00
4th "	.. 9.00	9th "	.. 2.00
5th "	.. 8.00		

No prize will be given if the number of competitors is less than 10 for one variety.

In order to be admitted to the competition, the competitors must have, for the varieties chosen by the society, a field of the acreage required in the circular letter of the undersigned.

The quantity of threshed grain to be inspected must be at least

25 bushels	for the oats.
10 "	" " wheat.
6 "	" " barley.
5 "	" " peas.
1 "	" " clover.
1 "	" " millet.
10 ears	" " corn.
1 bushel	" " beans.
25 bushels	" " potatoes.

No one will be admitted to these competitions except members of the society who have paid their subscription for the current year. A member who has not competed for the field crop competition will not be admitted in the threshed grain competition, and a competitor to the field crop competition who has not the required quantity of threshed grain is considered out of the contest.

The competitor obtaining the largest amount in prizes will receive a "Clipper

No. 2" cleaning machine with sieves, instead of the money to which he is entitled, providing, however, that he has competed for at least four varieties of grain. He will receive the "Clipper" at the nearest railway station, free of charges.

The inspection of threshed grain will be made free of charges for the society and the inspection work will begin the 15th of January.

The judges, while inspecting the threshed grain, will give points for the local where same is kept.

The list of entries to the field crop competition should be sent to the Secretary of the Agricultural Council, on or before the first of July, and that of entries to the threshed grain competition on or before the first of January.

The aim of these competitions is to encourage the farmers as much as possible, to prepare a sufficient quantity of seed grain for their own use or for the market.

J. ANT. GRENIER.

Deputy-Minister.

The main point to be noted in the regulations is the quantity of grain required from each competitor. In order that a farmer may compete for the first prize, he must have at least 25 bushels of well cleaned oats, 10 bushels of wheat, or 25 bushels of potatoes if the competition is with the latter crop. The quantities required for competing with the other crops are smaller and in accordance with their degree of importance as field crops. These grains must be sown, or sold for seed purposes only. Another point is that, instead of giving money for the first prize, a fanning mill is given free of any charge for this year to add interest to our experiment.

The score cards for judging the cleaned seed were prepared by Prof. R. Summerby, Macdonald College, P.Q. All the points which go to make good seed are well covered and the most important of them is the percentage of germination in grain for which 20 per cent is allowed.

RESULTS

The result was, as anticipated, that the average farmer will not do his duty toward deserving the encour-

agement given him by the government unless he is subjected to some control. To prove this, I cannot give you anything more conclusive than the reports from the Dominion Seed Analyst. These reports show that 50 per cent of the competitors in Champlain county exhibited oats which averaged 10 noxious weed seeds per pound and 200 of other kinds. The wheat was fairly well cleaned but 21 per cent of the lots exhibited germinated only 47 per cent after 4 days. None of the samples of clover and timothy graded above No. 3 and yet the seed fair held in that county last year was considered one of the best in the province. This shows that this system permits us to find out something which would have been impossible with a seed fair.

Considering the fact that the reports of both the standing field crop competitions and seed fairs in that county were considered to be very satisfactory last year and the previous years, and looking over the results of these competitions this year, one cannot help but conclude that the time had come for a change. The standing field crop competitions and seed fairs have been a good medium for stimulating the farmers and supplying information to them but, at the same time, I think they have served their purpose.

BENEFITS OF THIS COMPETITION

It compels the farmer to clean at least the quantity of grain required for the competition.

The judge instead of going to the seed fair and examining one bag of grain, is permitted to go to the farmer's place and see what he has done toward deserving the awards offered by the government. Besides, he will give the farmer valuable information regarding cleaning machinery, treatment of seed for disease, identification of weed seeds, etc.

It permits the farmer to find out from the results of the competition,

the quality of grain that he has prepared for seed, the number of weed seeds that it contains and the percentage of germination.

It permits the district representative in the county to know what the farmers in his district are doing towards improving their crops, the kind and quality of seed they have in their possession for that year, the cleaning machinery available, and furthermore, to answer intelligently any request regarding seed either from the farmers of his district or from outside.

It permits the government official, whether provincial or federal, who is in charge in a given province, to know, besides what I have enumerated for the district representative, where there is a surplus and a shortage of seed in the province. This information is, at present, materially lacking.

It permits the official in charge to check the work of his standing crop judges and thereby find out those who are doing the work at all properly and those who are not, something which is practically impossible under the present system.

SUGGESTIONS TO CONSIDER WITH THE ADOPTION OF THIS SYSTEM

1st. That more money be given and proper control exercised.

2nd. That the competitor be compelled to use registered seed only; if not available however, that improved seed be used until such time as registered seed may be grown in large enough quantity to meet the requirements.

3rd. That a society organizing a competition with one kind of crop be compelled to continue the competition for at least three years with that same crop, thereby improving and multiplying this crop in large enough quantity to meet the requirements of the whole district.

4th. That only competent men be employed as judges.

5th. That the threshed grain, for the province of Quebec at least, be judged as late in the winter as possible, so as to give the competitors plenty of time to prepare their seed, and so that those competing in pota-

toes may not have to open their cellars in the middle of winter.

6th. That in counties with more than one kind of crop entered in the competition, the farmer desiring to take part be obliged to compete in all of them.

STALLION CERTIFICATE

OSCAR LESSARD, SECRETARY, STALLION ENROLMENT COMMITTEE

THE Stallion Enrolment Act was adopted in 1919 by the province of Quebec, with a view to improving the horse breeding conditions in the province and eliminating, as far as possible, undesirable breeding animals. A committee of five, selected among the members of the Council of Agriculture, was appointed, and special inspectors were sent throughout the province to examine and report on all stallions. It must be admitted that some difficulties had to be overcome in the accomplishment of this work but over 800 stallions have been examined up to this date.

For the first year, and in order to insure as far as possible due observance of the law, the committee has been fairly broad in the classification of horses, and the breeding licenses are distributed as follows:—

Class 1, pure-bred horses, registered, highly recommended.

Class 2, pure-bred horses, registered, recommended (A) and (B).

Class 3, grade horses authorized.

Class 4, grade horses, tolerated (A) and (B), this year.

Inspectors' reports, giving the number of horses inspected, show that some owners of stallions have not observed the law and did not bring their stallions for examination. The committee intends to apply the law with the utmost rigour in the future.

The supervising committee also intends to publish, in November or December of each year, a full list of horses that have been inspected and for which permits have been issued. A list of the most desirable stallions for sale will also be published by the committee.

To add to the number of good breeding horses in the province, the Department of Agriculture has imported in 1919 some fifty horses, presenting all the qualities looked for in good breeding animals, and sold them to private individuals or to agricultural associations and breeding syndicates. This will greatly help to improve the horse-breeding situation, and the Act that was passed last year will also greatly contribute to the success of the efforts displayed up to date by the department and will certainly give good results, by preventing horses, discarded by other provinces, being re-sold for breeding purposes in Quebec.

The most prominent breeds in our province are the following: Percheron, Belgian, Canadian, Clydesdale, Hackney, Standard Bred, German Coach and French Coach.

It is hoped that all interested in the gradual improvement, of breeding, and chiefly of horse breeding, will realize the importance of observing this Stallion Enrolment Act and co-operating with the Quebec Department of Agriculture in this work.

ENROLMENT OF STALLIONS

BY OSCAR LESSARD, SECRETARY OF THE SUPERVISION COMMITTEE

THE reports of the inspectors appointed by the Quebec Department of Agriculture to

inspect the stallions in the province give the following numbers of enrolled stallions up to date:

Breed.	Number.
Percheron.....	58
Belgian.....	51
Canadian.....	62
Clydesdale.....	71
Standard Bred.....	58
Hackney.....	6
French Coach.....	2
German Coach.....	2
Suffolk Punch.....	1
Shire.....	1
Grade.....	451

The Stallion Enrolment Act, passed by the Quebec Provincial Government, is in force since January 1, 1919. Our inspectors have not, as yet, completed the enrolment of the stallions for 1920. It is hoped that the next report for 1921 will be still more complete than the one which is now being made up.

ONTARIO

NEW AGENT-GENERAL FOR LONDON APPOINTED

ONTARIO'S new Agent-General in London, England, is Dr. G. C. Creelman, B.S.A., LL.D., President of the Ontario Agricultural College since 1904.

Dr. Creelman graduated from the Ontario Agricultural College in 1888 and was subsequently engaged in professional work at one of the agricultural colleges in the United States. Later he was appointed superintendent of farmers' institutes for Ontario and in 1904 he became President of the Ontario Agricultural College. During the war he held the position of Commissioner of Agriculture for Ontario and carried out a programme which did much to promote the best interests of agriculture in the province. His experience gained through many years of public service in Canada admirably equips him for the administration of the duties connected with his new office. The business of the office will be largely confined to directing prospective emigrants to the opportunities that Ontario offers either from the standpoint of farm labour or farm investment. He will have direction of this work, not only in England, but in other European

countries as well. The best wishes of the people of Ontario are with Dr.



DR. G. C. CREELMAN, B.S.A., LL.D., NEW AGENT-GENERAL FOR LONDON

and Mrs. Creelman as they leave to take up residence in England.

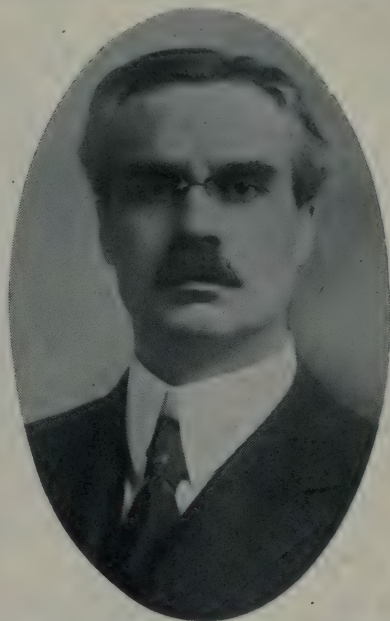
NEW PRESIDENT FOR ONTARIO AGRICULTURAL COLLEGE

THE appointment is announced of J. B. Reynolds, M.A., as president of the Ontario Agricultural College, Guelph, to succeed Dr. G. C. Creelman who leaves for England to assume the duties of Agent-General at London on July 1.

Professor Reynolds was born at Solina, Durham County, Ontario, December 25, 1867, and lived on the farm until he was seventeen years of age. He attended the Solina public school and Oshawa high school securing second class certificate in 1885, and matriculated with first class honours in mathematics at Toronto University in 1886. He was graduated Bachelor of Arts in 1893 having won first class honours in mathematics throughout the whole course. He received his degree of Master of Arts from the Toronto University in 1913.

From 1888 to 1890 he taught public school in Enfield, Ontario, and in 1893 was appointed dean of residence and teacher of mathematics, physics, and English, at the Ontario Agricultural College. He assisted in building up the two branches, physics and English, until 1906 when the work was divided and he chose English as his

special department. He was professor of English until 1915 when he was appointed president of the Manitoba



DR. J. B. REYNOLDS, M.A., NEW PRESIDENT
O. A. C.

Agricultural College from which College he comes to assume his new duties at Guelph.

1920 POTATO EXTENSION WORK

BY JUSTUS MILLER, B.S.A., FIELD CROP SPECIALIST

THE Potato Institute meetings conducted in the Province of Ontario during the past winter were held for the purpose of encouraging the commercial organization and general improvement of the industry. Ontario is geographically the best situated province or state in North America to cater to the commercial potato markets, with the exception of New York State. That state only excepted, Old Ontario has a far larger consuming population within a 300 mile radius and can produce, one year with another, a

more matured potato of finer table quality than can any other commercial potato producing section of the continent. To develop the industry, therefore, to a degree comparable or superior to that attained already by New Brunswick, Maine, New York, Michigan, Wisconsin, and Minnesota, we need adopt only their methods plus efficient co-operative enterprise.

The features most strongly emphasized at the meetings were: First, the increasing of the yield per acre by the planting of disease-free seed, preferably from Northern Ontario, the

home improvement of seed in certain districts in old Ontario, the control of disease in the growing crops, the practice of most profitable and practical cultural methods, emphasizing the necessity of planting sufficient seed to the acre; second, the supplying of a first class potato which would command the highest price in a discriminating market, i. e., a white, round potato standardized in the community, a well matured potato secured by sufficiently early planting, a clean, round potato of medium size graded according to legal grades; third, the selling of superior stock of this nature by co-operative shipping associations which would be properly organized, have efficient storage plants and would be prepared to ship during winter when prices were highest, thus spreading the distribution of the crop from fall to summer and preventing the autumn and spring gluts of high production years when accompanied by a severe winter.

Partly as a result of a trial Potato Institute held in the early spring of 1919, such an Association as advocated above was formed at Orangeville last year by U. F. O. clubs in the district. This association has been in very successful operation during the past potato season and served as a model, Mr. J. M. McNaughton, the manager, giving his experience at some of the meetings in the present series. The advisability of such local associations becoming affiliated with the central U. F. O. potato selling agency was strongly recommended.

In all, twenty-four meetings comprising forty-one sessions were conducted according to a well arranged schedule and programme.

Most of these meetings were of two sessions—usually afternoon and

night, but sometimes on two afternoons. In one case no meeting was held due to a blizzard. Eighteen different speakers were employed, and 100 different addresses were given. The total attendance was 1,461 or an average of 35 per session. The attendance was reduced by the influenza epidemic and by bad roads. Each session was designed for commercial growers only and each meeting was held in a commercial growing district.

As a result of the meetings, it has been decided that the time is ripe to organize co-operative shipping associations on the basis heretofore outlined, in fifteen different districts where no such organizations now exist. In this work the Department of Agriculture and the Central U.F.O. plan to co-operate. The definite organization campaign will be conducted before the shipping season commences, perhaps in June.

The potato extension work of the Department this coming season will follow this plan of organization closely. The inspection and certification of certified seed in Northern Ontario will be continued and expanded in co-operation with the Federal Division of Botany of the Central Experimental Farm. It is hoped also to make a substantial start in hill selection in the North for the production of registered foundation stock in co-operation with the Canadian Seed Grower's Association. The survey of disease conditions in old Ontario will be expanded and will be concentrated in the commercial producing districts of the province. Demonstrations *re* the value of seed from different sources, variety tests, etc., will be continued in co-operation with the agricultural representatives of the Department.

MOCK AUCTION SALE FOR JUDGING CLASSES

BY WADE TOOLE, B.S.A., PROFESSOR OF ANIMAL HUSBANDRY
ONTARIO AGRICULTURAL COLLEGE

IN the winter term of 1919 we started holding mock auction sales for our senior year students at the Ontario Agricultural College. Our idea was to familiarize the students with the actual market value of both pure-bred and commercial live stock of the various breeds and classes which we have at the college. We have found that our students lacked confidence in themselves to place a money value on stock and the system of holding sales has proven valuable in checking up their estimates of the stock brought before them. The past winter we have increased the work and it is my firm conviction that all the students at the college, whether taking the two year course or the four year course or even short courses, should get some experience in buying.

In the beginning we explain to the class that they are to buy as they would if they were to pay for the stock out of their own pockets. We allow the class to select from their numbers their own auctioneers, ringmen and clerk, and we make them responsible for getting out a catalogue of the entries after they themselves have selected the stock. The stock is then sold according to catalogue number and we find the system gives our students, from practical experience, a fair idea of how a sale should be arranged for and managed as well as an idea of prices according to market at the time the sale is held. We endeavour to have some market stock as well as pure-bred breeding stock. The sale is held in our judging pavilion; each student is given a

number of cards upon which to put down the price he would pay for each entry as soon as that entry enters the ring, then the cards are collected and the animal is auctioned going to the highest bidder. Students are marked according to the price they have placed on their card. After the animal is sold one of the members of the animal husbandry staff discusses the bidding and value of the entry. In this way we hope to check up our students and teach them something as to values. To my mind there is no better method of impressing upon the mind of the student market values of live stock than by showing him where he went wrong in his bidding. This year we have had two such sales, one in which we combined beef cattle and swine and the other dairy cattle and sheep. We sold about fifty entries at each sale and our students tell me that nothing that they have had in their college course has proven more valuable than these sales.

I believe that the Department of Agriculture would be doing a good work if they could arrange at an institution of this kind a big sale taking in all of the students, engaging a competent outside auctioneer and allowing the students to manage the sale and in the end giving prizes for those men who did the best work in all classes. My own opinion is that we must keep our animal husbandry teaching as close as possible to the practical work of the man on the farm, and when our students go out from the institution they should be able to value all kinds of farm animals without difficulty.

O.A.C. DAIRY SCHOOL

THE dairy courses in connection with the Ontario Agricultural College were largely attended during the session just completed making the present buildings and

equipment quite inadequate to properly handle the classes. By courses the registration was: Three months factory course, 67; one month farm dairy course, 23; cow testing, 28; ice

cream and soft cheese, 23; making a total of 141.

Fifty-six students wrote on the final examinations for the factory course. There were several competitions conducted in which cash prizes, made possible through the kindness of friends of the dairy school, were offered to competitors. The competitions included judging Ayrshires and Holstein, making cheddar cheese and butter and the pasteurizing and bottling of milk.

The cow testing class was large and enthusiastic. Some of the students had previously taken the factory or farm course, but a number were farmer's sons interested in dairying, cow testing, and cattle breeding, but had never taken a dairy course. The proficiency list of those who passed both the practical and written examinations includes twenty-five students.

STALLION CERTIFICATES

BY R. W. WADE, SECRETARY, ONTARIO STALLION ENROLMENT BOARD

IN the province of Ontario four certificates are issued for stallions as follows:

1. Approved Form A-I for horses of outstanding quality; 2. Passed Form I for horses that are considered sound enough and good enough for breeding purposes; 3. Form II for horses that have serious defects; and 4. Premium certificate for the horse

that is supposed to be of material benefit to the horse breeding industry of the province.

We have not yet demanded that the horse receive a premium on the quality of his get. This we believe would be a step in advance and has been recommended, but has not yet been incorporated in our stallion law in Ontario.

MANITOBA

AGRICULTURAL SOCIETIES

BY S. T. NEWTON, DIRECTOR, EXTENSION SERVICE

DURING the past five years the policy of the agricultural societies division has been not to encourage the organization of new societies particularly if the new society would be likely to injure an old established one. However with the return of the soldiers and their locating in new agricultural districts a number of additional societies will undoubtedly be required in order that proper encouragement may be given to the live stock industry in the newly settled districts, consequently these will be organized as occasion requires.

Owing to the last year's harvest coming about two weeks earlier than usual a number of societies found

their fair dates in the middle of harvesting. This necessitated the postponing of some fairs and considerably operated against the successful carrying on of all others, as it was impossible for many farmers to leave their harvesting operations. Altogether it was a rather disastrous year for the agricultural societies in so far as the annual summer fairs were concerned. This accounts for the smaller amounts paid out in cash prizes and indicates smaller government grants for the present year as the government grant is always based on the fair held during the previous year.

Good progress however was made in other phases of agricultural society

activity as may be seen from the following statements:

Seventy-one societies held summer or fall fairs; seventeen summer fallow competitions, and twenty-four ploughing matches were held. Forty-six seed grain and poultry shows, twenty-four standing field crop competitions, and three live stock sales were conducted; and thirty-three societies co-operated with the extension service in holding short courses. Several societies added considerably to their stables and other buildings.

In the summer fallow competitions for 1919, \$2,012 were paid out in cash prizes.

There was a slight falling off in the number of ploughing matches held and in a few cases the number of competitors was less than in 1918, but at the provincial match held at Portage la Prairie the competition was as keen as ever and the attendance was the largest in the history of the organization. Cash prizes paid for ploughing matches amounted to \$3,786.

The standing field crop competition is steadily gaining in favour as a means of making provision for a better supply of seed grain. Prizes given this year amounted to \$3,406.85. Many farmers who had fields entered in this competition sold practically all their crop for seed.

The number of seed grain fairs held was larger than usual but the number of exhibits was considerably less than in 1918 owing, first, to rust and later,

to extremely wet weather during the threshing season. The cash prizes paid out amounted to \$1,886. The experience of the past four years indicates that the seed fairs are not producing the results expected of them and new plans are being prepared for next season.

The Provincial Seed Fair or Soil Products Exhibition was held in February and was, considering the difficulties met with during the harvest, very successful.

The prize winning grains scored very high and the number of entries in each class was very gratifying.

The number of exhibits that actually won prizes was as follows:—

Wheat 74, Oats 56, Barley 42, Rye 12, Peas 6, Flax 9, Grasses 31, Vegetables 110.

Forty-six societies held dressed poultry shows and in most cases the number of exhibits was good when the price of grain is considered. The attendance at the institute meetings, which are usually held in connection with the dressed poultry shows, was smaller than expected and did not do justice to this valuable industry. Cash prizes paid amounted to \$1,921.50.

Horticultural work throughout the province has advanced and the horticultural societies are doing good work, also the programme of boys' and girls' clubs and other agricultural societies includes a great deal of work that comes naturally under the head of horticulture.

Agriculture is the greatest of our state industries. It has been stimulated by the pressure of war, and the task of statecraft is to see that it does not fall back to its earlier perilous position. We must have the co-operation of all classes to make this a success—the co-operation of the farmer, land-owner, laborer, and state. "Co-operation" is the word for capital and labor in all industries at the present moment, and without it we shall fail.—*David Lloyd George.*

ALBERTA

OPERATION OF STALLION ENROLMENT ACT

BY J. MCCAIG, PUBLICITY COMMISSIONER

THERE has been no change in the administration of The Stallion Enrolment Act since the initial year of operation 1919.

Last year the coming into force of the Act and the requirements of it were widely advertised and dates were fixed for the bringing in of horses to the fixed points of inspection. Six inspectors were required the first year but the inspection covers a period of three years for horses inspected. Fewer inspectors are required this year than the first year. Inspectors may have to cover the same ground but they will

have only about one quarter as many horses to inspect as they had the first year. There are now only two inspectors on the work, but they are engaged during the whole year.

There has been no change in the classification. Briefly the first class of horses includes horses that are both sound and good. The second class includes those that are sound but perhaps plain or a little off type or off size, and three includes unsound horses. Grades to be enrolled must be both sound and of good conformation.

School supervised home gardening requires only a limited amount of school time but it should have as definite a place and credit as any other school subject.

As a practical out of school hour subject gardening admits of the widest kind of correlation with other studies. There is no school subject from which more real knowledge can be gained of science, of art, or life's relations than from dealing with living, growing, plants.

The value of the garden products of the individual child may be small but multiplied by the production of millions of children the result will add materially to the nation's wealth.

PART III

Junior Agriculture

DEMONSTRATIONS, COMPETITIONS, AND CLASS-ROOM STUDIES IN RURAL
LIFE FOR BOYS AND GIRLS

BOYS' AND GIRLS' CLUBS

It is generally realized throughout Canada that any permanent achievement in agriculture must come through the present generation of school age boys and girls. These children are learning the value of co-operative enterprises. They are not pressed by the needs of pioneer conditions which urged their parents on in the endeavour to gain a livelihood under pioneer conditions in Canada. They are more free to employ science in agriculture. For this reason and because agriculture is now conceded to be our basic industry the departments of agriculture and education in all the provinces of Canada are putting forth an effort to guide the interests of the boys and girls in the direction of co-operation in agricultural pursuits. In every province live stock, poultry, gardening, canning and cooking clubs are conducted under the auspices of rural education associations, school fair associations, agricultural societies, representatives of the Department of Agriculture, etc., and the trend of all the endeavours is toward an advanced and harmonious programme of agriculture. The work in the various provinces differs in detail but the principle is similar from coast to coast as is shown in the following articles.

NEW BRUNSWICK

BY E. P. BRADT, B.S.A., SECRETARY FOR AGRICULTURE

BOYS' and Girls' Club work in New Brunswick has been very popular and the growth has been rapid. It can be safely stated that no other form of agricultural instruction work brings such apparent and immediate results as that carried on through the medium of the young people on the farm. They take a pride and enjoyment out of such work that is of the greatest value to themselves and which also makes the work interesting to those who may be directing it.

POULTRY CLUBS

Through the Poultry Division of the Department of Agriculture thirty-six clubs have been formed, with a total membership of 464. There was distributed, in all, to these clubs in 1919, 12,670 eggs and the estimated actual number of hens now

owned by the members is 8,000. These are serving as a source of supply of hatching eggs for the province. Two years ago it was practically impossible to get any bred-to-lay strains in the province. This spring (1920) the needs of the province can be supplied from our own breeders, not only for the boys' and girls' club work and poultry project work through the schools, but also the demands from other breeders desirous of obtaining these strains for hatching purposes. The plan for 1920 is to organize these clubs as centres for securing quantities of hatching eggs for general distribution throughout the province.

There were thirty poultry club fairs held in the province and birds to the number of 3,590 were exhibited. A number of the club members also exhibited at the larger provincial and county fairs in open competition and won a good share of the prize

money in the utility classes at these exhibitions.

Members of clubs have also entered pens in the egg laying contest held at Charlottetown, P.E.I., and Nappan N.S. In the former contest New Brunswick contestants stand 1st, 3rd and 6th in egg production.

In the latter contest, which has now been running twenty weeks, New Brunswick pens occupy the first five places and the eight pens entered are within the first thirteen places.

Woodstock.....	Yorkshire.....	sow.....	1 year.....	1st
	"	"	6 months.....	1st
	"	barrow.....	6 months.....	1st
Fredericton.....	"	sow.....	1 year.....	1st and 2nd
	"	"	6 months.....	1st and 2nd
	"	barrow.....	6 months.....	1st
	Chester White.....	sow.....	1 year.....	1st, 2nd, 3rd
	"	"	6 months.....	1st and 2nd
	"	barrow.....	6 months.....	1st and 2nd

Results obtained as indicated above need no further commendation. They speak wonders for the enthusiasm of these youthful breeders.

A number of new clubs will be organized during the year and the clubs already organized will be strengthened and built up.

SHEEP CLUBS

A start was made toward the organization of sheep clubs in 1919

PIG CLUBS

The success attending the poultry club work has been duplicated in the boys' pig clubs, of which there are twenty-two in the province, with a membership of 220. These clubs held sixteen fairs, with an average number of eleven pigs exhibited at each.

Equally successful were these youthful farmers when exhibiting their pigs at the provincial exhibitions at Woodstock and Fredericton. These pigs were exhibited in the regular open classes and won the following prizes:—

in a few districts of the province, but, due to the lateness of the season before organization could be completed, it was decided to withhold definite organization and distribution of sheep until 1920. These will be organized through a system of members getting credit from the banks, repayable in one year. Good grade ewes will be provided and arrangements made for the services of a pure-bred ram.

QUEBEC

BY J. A. GRENIER, DEPUTY MINISTER OF AGRICULTURE

THE Junior Breeders' Clubs are organized and directed by the Department of Agriculture of Quebec through the medium of its agricultural representatives and with the co-operation of the banks.

On the presentation of a note, signed by one of the members of these clubs and endorsed by the father or guardian, the banks will lend a sum not exceeding \$60 at the rate of 6 per

cent interest. To obtain this special rate, the borrower must attach to his note a certificate attesting to his membership in a club.

The purpose of these clubs is to provoke the interest of the young people and through them improve our methods of breeding, to familiarize them with commerce and book-keeping, and to make them understand and love agriculture.

REGULATIONS

1. Ten members at least are required to organize a club.

2. Only young folk from twelve to eighteen years of age can be members of it, after having obtained the consent of their fathers and guardians.

3. Each member should pay an annual contribution of 25 cents to pay the cost of administration.

4. The members of the clubs may engage in breeding of the following: cattle, swine and sheep. If swine raising is chosen, each member should buy two animals, a male and female; the first will be raised for slaughter, the second should be a pure bred female in order to do the breeding the following year. If sheep raising is chosen, each member may buy one or two females in lamb. Each club should keep a single breed only, unless it may be decided otherwise by the agricultural representatives, for special reasons. All subjects should be pure bred, except swine raised for slaughter.

5. The animals are bought by an officer delegated by the Department of Agriculture and driven to a central point, where they will be drawn by

lot, after the price of each has been fixed.

6. In taking possession of the animal that lot has designed to him, each member should weigh it and register the weight in a special book. He should, afterwards, weigh it once every month and keep an account of the value of the feed consumed.

7. All members should present their subjects at the exhibition of the junior breeders' club, the date of which will be fixed by the district representative. It will, as much as possible, take place at the same time as the local exhibition.

8. The prizes will be based on the value of each animal and the book-keeping done by each member.

9. The Department will pay a special subsidy of \$15 for each exposition, which should be distributed in prizes, as follows: 1, \$4; 2, \$3.25; 3, \$2.75; 4, \$2.; 5, \$1.50; 6, \$1; and 7, 50—The number and the value of prizes may be increased by personal subscriptions collected and what the persons or institutions who interest themselves in the development of agriculture may be disposed to give.

MANITOBA

BY S. T. NEWTON, DIRECTOR, AGRICULTURAL EXTENSION SERVICE

BOYS' and girls' club work in Manitoba will be carried on in close co-operation with the Department of Education, the Agricultural College, and the various farmers' and women's organizations in the province, as in previous years. No radical changes will be made in the plans described in these pages last year.

One departure, however, worthy of mention is the team demonstration and judging work on which the provincial championship trips will be based. Arrangements have been made to train demonstration teams in each inspector division. These

teams will each consist of three club members, a leader and two assistants already enrolled in one or more of the specified projects or contests. The subjects on which demonstrations will be given are: canning, dyeing, bread baking, and the preparation of school lunches.

Each member of the team will be familiar with every phase of the subject and while the leader is giving a history of the subject under consideration, her team mates will be preparing for the practical work connected with the demonstration, and later on each one will take her place

and explain her particular part of the work.

The main purpose of the demonstration is to develop in club members self reliance, self confidence, and the ability to describe the work which they are doing. Demonstration work also makes it absolutely necessary that each demonstrator is familiar with all phases of her subject. The demonstration work is planned especially for the girls, but boys are not debarred and it is altogether likely that when the winners are announced there will be several boys named in the list.

The special work provided for the boys is stock judging, poultry, and vegetable judging. Very naturally most of the champion teams will come from districts in which agricultural representatives are located.

The provincial championship trips for boys will be based, half on the ability of the competitors to judge live stock, and half on the score obtained on the animals which they own and are caring for.

No free or partially free supplies are provided, but lists of farmers, who have pure bred live stock and poultry and pure seed grain are kept on file for the benefit of those who wish to purchase better stock.

In addition to providing judges for all of the fairs, the Department of Agriculture supplies monthly instruction circulars for each teacher, judges' books, prize cards, entry tags, and posters advertising the fairs free.

Fifty per cent of the amount actually paid out in cash prizes at the fairs is provided by the Agricultural Department. Annual financial statements are sent to the Extension Service by the various clubs, consequently to all intents and purposes the boys' and girls' clubs are on the same financial basis as the agricultural societies. In fact, practically all the school exhibits formerly provided for in the agricultural society prize list have been transferred to the boys' and girls' clubs. There is, therefore, no duplication of prizes.

Last year 81 clubs took advantage of the Bankers' Competition, and this year each of the 250 clubs is complying with the terms of this competition.

Two members of the Extension Service Staff, H. E. Wood, B.S.A., and Margaret Speechly, B.H. Ec., devote all their time to boys' and girls' club work. In addition some of the senior year girls from the agricultural college who have had considerable experience in teaching, will assist during the summer months in training club members in canning, cooking, dyeing, etc. They will also assist in judging at the boys' and girls' club fairs.

As the agricultural fairs nearly all come in July and August, and the boys' and girls' club fairs in September and October, no difficulty is met with by reason of one encroaching on the other.

SASKATCHEWAN

BY JOHN G. RAYNOR, B.S.A. ACTING DIRECTOR, EXTENSION SERVICE

DEFINITE official recognition was first given to the boys' and girls' club movement in Saskatchewan at the beginning of 1918, when an assistant to the director of Agricultural Extension at the University was appointed. The majority of his time was to be given to young people's work. Before this time a few club contests had been

taken up in a somewhat incomplete way, as a part of the work of some school fairs, but nothing in an organized way had been carried on throughout the province. From the date of the appointment mentioned above an endeavour was made to give assistance to any organizations such as agricultural societies, school fair associations, and rural educational associa-

tions, expressing a desire to support the club movement. While such associations were given assistance with any contests they wished to take up, those especially encouraged were pig and poultry raising and potato growing. One of the prime objects of the club work at that time was to render national service by assisting in the production of foodstuffs and the three contests mentioned were considered to offer the most effectual ways of doing this.

The work was studied carefully during the year and early in 1919 a bulletin entitled "Saskatchewan Boys' and Girls' Clubs" was prepared giving general directions for the guidance of the clubs and a plan of organization which was briefly as follows: Clubs to be organized at the central point in the municipality or community (usually the market and social centre) and each school using this centre to be organized as a branch or unit of the club. An endeavour was made to have each club serve the territory included in the rural municipality in which it was situated in so far as topography, roads, etc., made this possible. This would simplify the division of territory considerably and each club could then have as many branches as there were schools in the municipality.

It was also decided that the club work should be linked with some already existing organization whose programme of work was broad enough to include the club work and which

would be likely to serve the entire province. The rural education association appeared to fill the requirements and accordingly the clubs are being organized under these associations wherever such exist. As the name of this organization would imply, its programme is broad and it has the advantage of already having the goodwill of the school inspectors, teachers, and trustees. Wherever feasible also this association is given municipal bounds and is expected to serve all the territory in the rural municipality in which it is situated. The plan usually followed is to select a committee through the executive of the R.E.A. to take complete charge of the club work under the auspices of the association. Where no association exists the work is organized in whatever way would seem to be most suitable. With the development of the work it is probable that the province will be further divided into the districts included in the school inspectorates of the province and the wishes of the school inspector, as to the organization of the work in his district, will be followed as nearly as possible.

For 1919 only one other contest was added, namely, gardening and canning. It was felt that better results would be obtained by concentrating on a few rather than a large number of contests. Each club may take up as many of the contests as desired. Detailed information on the extent of the work in 1918 and 1919 is given in the following tables:

1918

Contest	Members Enrolled				Total Members	Total Exhibitors	Number of stock raised.
	Boys		Girls				
	Memb.	Exh.	Memb.	Exh.			
Calf raising.....	139	129	36	23	175	152	175
Pig raising.....	245	153	83	43	328	196	575
Poultry raising.....	298	269	139	120	428	389	1,284
Potato growing.....	36	34	21	18	57	52	
Judging contests.....	869	.....	139	.....	1,006		
Miscellaneous.....	21	21	.....	.....	21		
Total.....	1,608	606	418	204	2,015	789	2,034

1919

Contest	Members Enrolled				Total Members	Total Exhibitors	Number of stock raised.
	Boys		Girls				
	Memb.	Exh.	Memb.	Esh.			
Fig raising.....	337	167	122	37	459	204	688
Poultry raising.....	426	228	227	71	653	302	1,959
Potato growing.....	354	200	230	109	584	309	—
Gardening and canning	135	71	179	94	314	165	—
Calf raising.....	102	49	42	11	144	60	144
Judging contests.....	768	768	43	43	811	811	—
Colts.....	34	34	2	2	36	36	36
Miscellaneous.....	13	13	20	20	33	33	—
Total.....	2,169	1,530	865	390	2,034	1,920	2,827

The organization plan for 1920 is practically identical with that already described. The contests advocated are the same except that the gardening and canning contest is dividend and sheep raising is added. By dividing the gardening and canning contest it is felt that many more will enroll in the canning contest than would be the case if it were incumbent upon the contestant to grow the vegetables used for canning. The pig and poultry raising and potato growing contests have been very popular. Some particularly successful potato growing contests were organized last year. The sheep raising contest has many advantages and it is felt that its addition will be popular. It is a difficult contest to organize and every assistance will be given clubs wishing to undertake the work. One sheep club has been organized at Maidstone where 28 members have already taken delivery of two ewes each. This club gives promise of being very successful. This contest should result in a more general interest being taken in sheep and should be very worthy of encouragement.

The adverse conditions of the season of 1919 militated against the club work considerably but from the general interest being taken in the movement this spring the indications are that 1920 will be a banner

club year. Some of the school inspectors are taking hold and arranging to organize their entire inspectorate with assistance from the extension department. Most of the rural education associations are including club work in their 1920 programme. A very general interest is being taken in the work by local bank managers and their assistance is always valuable.

The department gives assistance in organizing clubs to the extent that limited staff makes this possible; provides club literature such as bulletins outlining the work, membership report forms, record books, etc.; provides for demonstrations in such subjects as canning, stock judging and sheep shearing, and supplies judges for the club fairs in the fall. No material whatever such as eggs, seeds, etc. is supplied by the department. The most that it is attempted regarding such material is to recommend reliable sources of supply.

The club fairs are usually held late in the fall, preferably during the latter part of September or early in October. An endeavour is made to have the club executive and the school exhibition executive co-operate by holding these fairs jointly. This is done in practically every case and by making for economy in the use of judges and avoiding much duplication of effort, it is an altogether advisable practice, and has worked

out admirably in practically every particular. The aim of the club movement is to use definite vocational contests dealing with the farm and the home as a means of augmenting the education of our boys and girls,

and to give them the business training, the dignity of ownership, the exhilaration of competition, and the many other joys which come from doing, under intelligent direction, a man-sized or a woman-sized job.

ALBERTA

BY JAS. MCCAIG, M.A., CHIEF PUBLICITY COMMISSIONER

THE Department of Agriculture for Alberta has not developed club work to a very great extent. One reason for this is that the sparseness of population makes it difficult to get even a limited number of meetings of boys or girls and this is a necessary part of the benefit secured from club work. The work that is being done for Alberta boys and girls is accomplished by using the school organization for garden or stock enterprises and giving directions in the schools with regard to these activities.

School fair work has absorbed a good deal of the effort of agricultural representatives and the school fair work is chiefly school garden work which is concerned with work such as cultivation and plant growing in home gardens. The largest part of the extension work in Alberta is done from the agricultural schools and by teachers of the schools between teaching terms. The plan of using the teaching staffs of the schools in this way seems to be an economical and natural plan as winter travelling is not always easy and good meetings are hard to get.

In a number of the school fair districts in which the teachers of the agricultural schools work, school clubs have been started. This is scarcely general, but colts, calves, pigs and to a lesser extent sheep and sometimes poultry are exhibited at practically all the fairs. The standard prize list recommended for the school fair associations includes these exhibits, so that while clubs are not general, the work that is commonly done by clubs is being satisfied through the school fairs.

There were, however, three agricultural representatives at work throughout the year 1919. One at Sedgewick, Edmonton, and Stony Plain. Besides the school fair work these representatives during last year had a number of clubs. In the Edmonton district there were six clubs with sixty members, in the Stony Plain district there were five clubs with thirty-five members, and in the Sedgewick district there were eighty-two members in various clubs organized for the raising of poultry, calves, colts and pigs. An attempt was made about three years ago to establish pig clubs which should keep only pure bred stock and it was expected that pigs or one pig that was raised in the first year should be kept still by the children for the raising of litters of pigs in the second year. This plan has not gone on successfully and now operations are confined wholly to commercial pigs and to one year operations or enterprises.

A lot of successful business work is done in connection with some of the pig clubs. In judging, for example, the awards were placed on the following basis: conformation and quality 50 per cent, average daily gain 20 per cent, economy of gain 20 per cent, the keeping of records 10 per cent. The results obtained were quite satisfactory. After the cost of the pig, the feed, insurance and interest, the net gain ran from six to eleven dollars per pig. Calf clubs in the Sedgewick district have had large success. Boys and girls in the calf clubs of local school fairs have become exhibitors in a few cases in the baby beef classes at the Edmonton and Calgary fairs.

ONTARIO

TEACHERS' SUMMER COURSES IN AGRICULTURE

J. B. DANDENO, PH. D. INSPECTOR OF ELEMENTARY AGRICULTURAL CLASSES

AS agriculture is an optional subject on the high school course of study in Ontario, and as the curriculum of these schools is considered by many teachers to be exceedingly heavy, a relatively small number of secondary schools have so far attempted to meet the needs of those who expect to become teachers in rural or semi-urban schools by introducing and carrying on classes in agriculture. While this need is not met there will be an ever increasing demand for the instruction in this subject in institutions apart from the high schools.

Courses will be continued as heretofore in connection with the O.A.C., ample use being made of the splendid staff and equipment of that institution. Whitby Ladies' College will also be made use of for teachers of public and separate schools who may be living east of Toronto. In addition to the above centres another will be provided in 1920 at Monteith, Ontario, for teachers living in the northern districts of the province.

It is expected that the Ontario Agricultural College will care for all those who expect to teach agriculture in secondary schools in addition to those who take the course leading to an elementary certificate and who live west of Toronto.

The course leading to an elementary certificate will be practically the same in all three institutions and will lead to the same certificate.

Any person who holds a certificate qualifying him to teach in any of the schools of the provincial system may be admitted to the elementary course. Any person who is qualified to teach science in a secondary school may be admitted to the course leading to an intermediate certificate.

The travelling and living expenses incurred while attending any of the summer courses in agriculture will be refunded to the teacher on condition that agriculture will have been taught by such teacher throughout the year following that in which the course was taken.

POPULARIZING HIGH SCHOOL AGRICULTURAL INSTRUCTION

BY GEO. S. JOHNSON, B.A., PRINCIPAL, WHITBY HIGH SCHOOL

DURING the past year we have been endeavouring to bring the matter of agricultural education before the people of our high school district. Agriculture is comparatively a new subject on the curriculum, and the organization of an agricultural department is still less familiar to the people of the rural districts.

In order to build up this department in our school and to popularize the teaching of agriculture in the schools in general, we have undertaken to place before the people fairly, the status of agriculture in our present system of education.

To this end we have solicited, and received the co-operation of the local farmers' club and of the teachers in the rural schools of the district.

We have been carrying on this campaign of publicity for more than three years, working chiefly through a few of the teachers of the rural schools, who have been interested by means of evening entertainments in their various schools. During these evenings the motion pictures were the chief attraction and always at the close of the meeting the matter of agriculture in the schools was taken and explained by the inspector of public schools and myself. In

a number of sections we found that the farmers were more or less opposed to the teaching of agriculture, taking refuge in the classic objection, that a girl can't teach their boy how to farm. However, we soon found that this objection was based upon ignorance or a misunderstanding of the scope of the work, and some of those who had opposed the work most strenuously at first became the most ardent supporters when they had the whole matter explained to them.

This year, as stated above, we have commenced to work more directly with the farmers of the district. The high school, with its laboratory, assembly hall, and motion picture machine, has been placed at their disposal for the purpose of experimental demonstrations and lectures. We want to get the farmers and their wives to consider that the high school is an educational centre for them as well as for their children, and we believe that we will have, as a result of this, a much larger percentage of the children of the rural districts coming on to the high school, and not being satisfied, as formerly, with merely a public school education.

This spring we have held four meetings, all of which were well attended and appreciated. Next fall we purpose announcing a series of lectures and demonstrations along the same lines.

The first meeting was more for the purpose of getting the people acquainted with the idea we had in mind. The feature of the evening was agricultural films. To this meeting was invited the farmers and the teachers of the adjacent rural schools and their entrance classes. The whole school with its domestic science class room, agricultural class room, and farm mechanics workshop was thrown open for inspection. This was the first time that about ninety per cent of those present had

ever heard that there were such things in the school.

The second meeting was in the form of a milk testing demonstration. The farmers were invited to bring along samples of milk, cream, and skim-milk and have them tested. A large number of samples were brought in and over a dozen were tested during the evening. Two of the boys of the agricultural department of the school carried on most of the testing. The samples untested that evening were tested next day and the results forwarded to the farmers concerned.

The third and fourth meetings were held on the one day, one in the afternoon and the other in the evening. Prof. Henry S. Bell, B.S.A., of The Soil and Crop Improvement Bureau, Toronto, was invited to give two lectures, one in the afternoon on "Potatoes" and the evening one on "Plant Food and its Management". Both lectures were illustrated, the one by charts and experiments and the other by lantern slides. The talks were practical and that they were appreciated was evidenced by the discussion following each lecture.

A merchant who does not advertise gets only the casual trade. The high schools in the past have been getting those who would come anyway. The fact that the large percentage of boys and girls of the rural schools go no further than the entrance class is due largely, I believe, to their ignorance of what the high schools have to offer. To support this statement, I might quote from a letter received from one of the teachers after the first meeting of the series mentioned above. She said, "I have an entrance class of five, two were going on to high school anyway, but since the meeting on Monday evening the other three have told me that they want to go on." This leaves us with the question, should a high school advertise.

CENTRE MANITOULIN SHEEP CLUB

THE Centre Manitoulin Sheep Club has been organized in Mindemoya by the agricultural representative working in conjunction with the Merchants Bank of Canada.

The idea of the club is to provide the boys and girls between the ages of ten and nineteen with pure-bred Oxford ewes. As there were twenty applications, and only twenty pure-bred Oxford ewes could be secured locally each applicant received only one animal. The fifty cent membership fee goes to cover unavoidable losses and a registration fee for a transfer. The Merchants Bank paid for the ewes and accepted promissory notes from the club members for the total amount due in seven months at 6 per cent interest. Thus the initial expenses have been small.

The members will shear and sell the wool and will exhibit the ewes and lambs at the school fair at Mindemoya in the fall. Special prizes for this class will be provided by the Merchants Bank. It is proposed to hold an auction sale at that time when the club members can bid in their flocks by paying their notes or may sell their stock, receiving all amounts above the face value of the notes plus interest. The main reason for inaugurating this plan is a desire to help the boys and girls to become owners of pure-bred live stock and further to introduce finer woolled sheep into this community, as at present practically all their sheep are long woolled.

MANITOBA

BOYS' AND GIRLS' CLUB ACHIEVEMENTS

BY S. T. NEWTON, DIRECTOR

THE Manitoba boys and girls in 1919 raised 887 pigs, 871 calves, 356 sheep, 255 colts and 4,433 chickens. As not all club members were so situated that they could own live stock the interest of many of the members went beyond this industry and into other branches of agriculture. Cookery and gardening occupied the attention of many girls and boys with the results that in cookery there were 9,792 exhibits as compared with 9,433 vegetables. The quality in both cases was much better than in previous years. In the matter of vegetable canning Manitoba boys and girls have a distinguished achievement to their credit. Among the various projects canning stood third with nearly 5,000 exhibits. The showing of over 1,000 dairy exhibits suggests that dairying too is to receive a great deal of attention.

During July and August ten-day short course classes in woodwork were held at fourteen places in co-operation with local trustee boards and most of the 1,600 woodwork exhibits can be traced to these schools. There was a marked improvement in the record-keeping work in 1919 both in neatness and in the number of records, over 2,250 being shown at the various fairs. School work has always been a very important feature at the club fairs and during the year there were entered about 28,000 exhibits of actual school work. Of the 30,000 club members fewer than 2,000 failed to carry their work through to a successful conclusion and have exhibits at the fairs.

The success of club work in Manitoba is due to several very important factors:

1. There is a particularly good working arrangement between the

Department of Agriculture and the Department of Education, whereby there is no duplication of effort and no consequent misunderstanding.

2. The Extension Service is so organized that the entire Extension staff is available at certain busy seasons in club work notably in the spring and fall.

3. The Agricultural College staff is also available at fair time, and this affords a splendid opportunity for them to get in touch with country

conditions. Club members also enjoy meeting members of the staff and getting first-hand information about the college and its work.

4. Club work receives splendid financial support from both the trustees and the government. In fact, we know of no province or state where more support is given.

5. Teachers, trustees, and parents gave the club work enthusiastic encouragement, and many business men and women gave a great deal of their time to the direction of clubs

ALBERTA

SCHOOL FAIRS 1919

BY J. G. TAGGART, B.S.A., PRINCIPAL, SCHOOL OF AGRICULTURE, VERMILION

IN 1919, Alberta school fairs were conducted under the direction of the agricultural schools. The principal of each school had supervision of the fairs in the district served by his school.

The public school inspectors, while as a rule having no direct control of the fair work contributed materially to its success. Committees of local people were organized at all school fair centres for the purpose of caring for all local details of management and raising a share of the prize money.

The agricultural schools with funds provided under *The Agricultural Instruction Act*, supplied seeds, printing, and judges. The school inspectors assisted in the organization of new centres, gave advice and directions to the teachers concerned, assisted in judging several departments of the fairs, and in a number of instances acted in the capacity of local committee men. Local committees managed all local matters connected with the fairs, such as the

distribution of seeds and prize lists, securing a place to hold the fair, and arranging exhibits. In addition, a large part of the prize money was raised, chiefly by levies on the schools participating. The local secretary paid all prizes and settled claims.

AGRICULTURAL

Under the direction of the three agricultural schools there were held 40 fairs, which included 440 schools and 6,500 pupils. In all classes there were approximately 25,000 exhibits. The total prize money paid was slightly over \$6,000 of which less than \$1,000 was contributed by the government from the funds provided by *The Agricultural Instruction Act*.

Very few of the fairs could be considered failures; many were more successful than in any previous year. This result was due largely to the fact that local people were interested in the fairs both financially and as managers of all local activities.

PART IV

Special Contributions, Report of Agricultural Organizations, Publications, and Notes

WHEAT IMPROVEMENT AND CULTIVATION ENCOURAGED BY THE CANADIAN SEED GROWERS' ASSOCIATION

BY L. H. NEWMAN, SECRETARY

WHEN the Canadian Seed Growers' Association was organized in 1904 it adopted a system of selection suited to the peculiarities of leading farm crops and aiming at their improvement. The wheat crop naturally occupied first attention. At that time the varieties grown commonly throughout the country were more or less mixed. In the west, Red Fife was the leading sort while certain cross-bred varieties such as Preston were receiving considerable attention owing to their early ripening ability. In Red Fife there were commonly found certain aberrant types believed to be of inferior quality and whose eradication was therefore sought. On the other hand it was believed that the system of selection adopted by the Association, namely mass-selection, would have a beneficial effect. That such improvement actually took place there is ample evidence. We have to-day certain strains of Red Fife, for example, which growers refuse to abandon, as they find that no varieties with which their selected strain has been compared is able to outyield the latter on their particular farms. As pure seed became more and more available and as these important strains became fully appreciated the production of wheat naturally increased and became extended to a considerable extent.

As the scientific breeding and selection of wheat became developed at experimental stations in this and other countries, a quicker means of obtaining purity of type came into operation. It was discovered that plants like wheat which in the main are self-fertilized, will reproduce its characteristics relatively true from generation to generation when a single head is used as the starting point. The so-called "head row" method of selection at experimental stations has therefore become universally practised, with the result that members of the Association have been able to start in with relatively pure strains instead of having to purify them by the slower process of mass-selection. The chief problem of members of the Association growing seed at present resolves itself largely into that of maintaining the purity of the strain and of propagating the same so as to be able to supply considerable quantities of seed wheat which may go out to the trade in sealed sacks as what is known as "Registered" seed.

While wheat is normally self-fertilizing, yet it is now known that cross-fertilization may occasionally take place. This fact provides an opportunity for the individual grower to make a still further advance by isolating strains possessing qualities of greater value than the parent stock. Realizing this, a number of

growers are carrying on head-row selection work on their own farms. The importance of encouraging this sort of work can scarcely be estimated. It is a notorious fact that some of our best varieties of wheat have been developed by individual farmers. Red Fife for example, was isolated and developed by David Fife of Peterborough county, Ontario. Our leading autumn wheat, namely Dawson's Golden Chaff, was developed by a Mr. Dawson living in Waterloo county, Ontario. The Kitchener wheat which is becoming quite popular, especially in south-western Saskatchewan where moisture is usually at a premium, was produced by Mr. Seager Wheeler, of Rosthern, Saskatchewan, being selected out of the well-known Marquis wheat. A somewhat similar selection, registered under the name of Kitchener-D has also been selected out of Marquis by Mr. F. J. Dash, of Hillesden, Sask. An early strain of Red Fife wheat, which in some parts of the West has given good satisfaction was selected by a Mr. Smith, of Saskatoon, Sask. The Marquis variety which has been such an enormous boon to Western Canada and which was produced at the Central Experimental Farm, Ottawa, is being grown and re-selected by a large number of members of the Association at present. This variety has not reproduced absolutely true as one might expect in view of its origin, being a cross-bred sort. In the ordinary field of Marquis one can find a greater or lesser number of white chaffed bearded forms, or red chaffed forms bearing long awns, of velvet chaffed forms and many

others which might be mentioned. The ordinary system of mass-selection, having failed to rid the variety of these forms, a number of growers have introduced the head row system. Probably the best work along this line has been done by Mr. W. Lang, of Indian Head, Sask., who each year conducts a special head row plot with a view to isolating not only pure strains but superior strains for propagation by the Angus McKay Farm Seed Company, of which he is a member. Formerly much difficulty was experienced by the continued reappearance of the aberrant types mentioned above. Nowadays, however, thanks to Mr. Lang's patient effort, the company is able to propagate on a very large scale a pure and productive strain.

The value of the work being performed with wheat, especially in Western Canada by the large number of members now operating is making itself felt very widely. It is extending rapidly and will probably develop still more rapidly.

With the great care which members have come to devote to the selection of their seed, has naturally come a greater consideration of proper methods of soil cultivation. It has been shown that the proper treatment of the soil has an enormous influence on the success of a given variety and to quite an extent on the date at which it matures. This fact together with the fact that there are now available certain early varieties and strains will result in wheat being produced successfully under conditions which formerly were considered inimical to the profitable growing of this great cereal.

CONVENTION OF TECHNICAL AGRICULTURISTS

The organizing convention of the Canadian Society of Technical Agriculturists is to be held at the Chateau Laurier, Ottawa, on June 2nd, 3rd and 4th. Delegates from the various provinces have already been appointed, and in addition to these there will also be present a large number of members

of the society who have expressed their intention of being at the meetings.

The results which have been obtained by the organizing committee since the membership campaign was launched at the beginning of the year, are indicated by the fact that the total membership on May 15th

had reached three hundred and fifty. It is fully expected that this list will have increased to nearly five hundred by the time the convention is held, and will include practically all of those engaged in technical agricultural work in Canada.

The president, vice-president and honorary secretary-treasurer, who have recently been elected and who will hold office during the first year, are as follows:—

President: L. S. Klinck, University of B.C.
Vice-president: H. Barton, Macdonald Col-

lege. Hon. secy-treas.: L. H. Newman, Dept. of Agriculture, Ottawa.

Some of the principal speakers at the coming convention are Dr. Jas. W. Robertson, Dr. J. H. Grisdale, Dr. M. Cumming, Professor H. Barton, President Klinck, Professor J. W. Crow, Dr. W. P. Thompson, Dean Rutherford, Dean Howes, President Reynolds, Dr. F. C. Harrison, Hon. J. E. Caron, Hon. Manning W. Dougherty, Tom Moore and the Hon. S. F. Tolmie.

HOME MADE PAMPHLET BOXES

BY R. S. MACKINTOSH, UNIVERSITY FARM, ST. PAUL, MINN.

For the filing of publications we are using home-made pamphlet boxes which we have found to be entirely satisfactory. They are cheap, easily made, and dust proof.

The sides and front are made of No. 10 "auburn cloth" board. The bottom and

before bending. Strips of binders' cloth, 6" by 11", are pasted on the front and the labels are put on after the cloth is dried. Small brads are used to fasten the boxes together.



HOME-MADE PAMPHLET BOXES RECOMMENDED FOR FILING PUBLICATIONS.
THE ONE ON RIGHT READY FOR NAILING. CENTER ONE SHOWING
OPEN END. THAT ON LEFT READY FOR LIBRARY SHELF

top pieces are of soft wood from $\frac{1}{4}$ " to $\frac{3}{8}$ " thick, 7" long and of whatever width may be desired. The "auburn cloth" board is cut 11" by 16 $\frac{1}{2}$ " for a 2 $\frac{1}{2}$ " box, 11" by 17" for a 3" box, or 11" by 18" for a 4" box. It is scored or partly cut through on one side

The accompanying illustration shows three views of these boxes. The one on the right has been scored ready for nailing, the centre one shows the open end, and that on the left shows the filing case as it appears on the library shelf.

ASSOCIATIONS AND SOCIETIES

RURAL SCHOOL EXHIBITS AT CENTRAL CANADA EXHIBITION

The directors of the Central Canada Exhibition Association have voted \$990 to the agricultural products department of the exhibition for prizes which are to be awarded to rural school exhibits which will be shown at the Central Canada Exhibition at Ottawa in September. There are nine main prizes as follows:—\$150, \$125, \$100, \$90, \$80, \$70, \$60, \$50, \$40 and in addition to these there are a number of commendables of \$25 and \$20 each.

This plan has been worked out by Geo. H. Clark, W. D. Jackson, and G. Lelacheur of the agricultural products committee and has been approved by a progressive exhibition association directorate.

The competition will be between schools and should attract wide attention which will mean increased attendance of rural people visiting and taking part in the exhibition.

According to the regulations this competition is open to rural schools taking part in the rural school fairs. Each school will be allowed 15 running feet of space for displaying the exhibits. The exhibits are to be made up of not more than fifteen kinds of products including cereals and other grains, vegetables and fruits, and must also include cut flowers, canned fruit and vegetables, botanical and entomological collections, etc. All varieties are to be labelled with the correct name. Awards will be made by score card and all products in the exhibit must be the work of the pupils in the schools exhibiting.

Fifty per cent of the prize money won will go to the teacher or other person in charge of the exhibit, the balance to be disposed of as the teachers and pupils may decide after deducting expenses.

CANADIAN SEED GROWERS' ASSOCIATION

BY L. H. NEWMAN, SECRETARY

The annual meeting of the Canadian Seed Growers' Association and of the Board of Directors which control the affairs of this organization, was held in Ottawa, on March 20th. The meeting was fairly well attended, there being representatives present from a number of the provinces. Probably the most important business transacted was the amending of the regulations *re* the process to be followed in the selection of seed leading up to registration. Heretofore Elite Stock Seed in the case of cereal grains could be produced only from seed obtained from heads or panicles selected by hand. The new regulations provide that where seed originating from a "pure line" is grown that a careful roguing or "culling" out any foreign or questionable looking plants may be allowed to take the place of positive selections. This change will necessitate very rigid inspection but, on the other hand, will permit members to propagate Elite Stock Seed and first generation seed in much greater quantities than formerly. The lack of a sufficient quantity of Elite Stock Seed in the past has been a serious detriment to the propagation of large quantities of registered seed.

It was resolved that the association become a member of the International Crop Improvement Association. The latter association was organized last December. It comprises a federation of State Crop and Seed Improvement Associations of North America. The object of this organization is to establish a close relationship between the various organizations engaged in seed improvement work. It is proposed that the annual meeting be held at Chicago at the time of the International Seed Grain and Hay Exposition in December. At this meeting an excellent opportunity should be provided for the exchanging of ideas and for the standardizing of terms used in the registration of seed.

This organization should provide an excellent opportunity for bringing Canadian officials in touch with our American neighbors, and to this extent, in giving publicity to Canadian products.

It was decided that the Association should put on a special exhibit on the occasion of the next show at Chicago with a view to advertising Canadian grown seed. There is a growing interest in the United States in northern grown seed of all kinds and the Board of Directors is fully alive to the possibilities of developing a substantial trade in seed grain and potatoes with the South.

PRIZES WON BY MEMBERS

The directors' report referred to the excellent progress which had been made by the association during the past season when the number of applicants for membership had more than doubled over those received during the preceding year. Reference was also made to the excellent showing made by members of the association at International Expositions. At the International Soil Products Exposition at Kansas City last September the first prize and Sweepstakes for the best bushel of Hard Red Spring Wheat went to Mr. J. S. Fields, of Regina, who is one of the most enthusiastic members of the association in western Canada. Kjellander Brothers of Wilcox, Sask. captured the first prize for Hard Red Spring Wheat grown under dry farming conditions. Other high prizes were also carried off by members. At the International Seed Grain Show at Chicago Mr. Fields won out over all competitors in White Oats. His sample of Victory Oats weighed 48.6 pounds per measured bushel. Mr. Seager Wheeler won first prize with two-rowed barley, while J. W. Lucas of Cayley, Alta., won first in the class for Black Oats. In the Hard Red

Spring Wheat class there were 97 entries, and Canadians were successful here in carrying off the first five prizes, all but one of which went to members of the association.

The number of growers affiliated with the association up to the date when the last statement was prepared was 1644. The report referred to the fact that the seed catalogue issued by the association for the current year listed over 100,000 bushels of registered and improved seed. It was pointed out, however, that several thousand bushels of this class of seed not listed in the catalogue, was exchanging hands. Last year over 1,000 individual farmers purchased registered seed which passed through the transfers at head office. In addition to this

many farmers purchased seed which was not recorded in the official transfers.

The annual meeting was addressed by Hon. Dr. Tolmie, Minister of Agriculture, Dr. J. H. Grisdale, Deputy Minister of Agriculture, Geo. H. Clark, Seed Commissioner, and others. The report covering the year's work as well as extracts of the addresses presented will be printed and will be available for distribution at the office of the Publications Branch, Ottawa.

The officers for the ensuing year are as follows: President, Dr. Jas. W. Robertson, Ottawa; secretary, L. H. Newman, Ottawa, and a board of seventeen directors appointed from all the provinces.

CANADIAN NATIONAL POULTRY ASSOCIATION

Poultrymen representing provincial poultry associations and provincial departments of agriculture met in Ottawa during the third week in March on the invitation of the Minister of Agriculture. Their deliberations resulted in the formation of a Canadian National Poultry Association which will take care of all matters pertaining to the advancement of the industry and will administer the registration of poultry. This registration is based upon performance and only such birds will be recorded as qualify under the Record of Performance.

Dr. S. F. Tolmie, Minister of Agriculture, Dr. J. H. Grisdale, Deputy Minister of Agriculture, and Mr. H. S. Arkell, Live Stock Commissioner, addressed the delegates. They pointed out the importance of the various phases of the poultry industry and indicated avenues through which the new association might achieve greatest success.

The association is to have a directorate of twenty made up of two representatives from

each province acting with the Dominion Poultry Husbandman and the Chief of the Poultry Division of the Federal Live Stock Branch. The directors elected the following executive committee from among their number: President, Dr. R. Barnes, Ottawa, Ont.; western vice-president, M. W. Kerr, Brandon, Man.; eastern vice-president, Dr. S. Lafortune, Point Gatineau, Que.; secretary-treasurer, Ernest Rhoades, Live Stock Branch, Ottawa.

The rules of entry for registration allow that only pure bred females and pure bred males shall be admitted. The females must qualify in the Canadian Record of Performance for Poultry A and AA. The minimum record to permit a bird to qualify in the Record of Performance is 150 eggs in 52 consecutive weeks. The eggs to be of the quality of specials and averaging in weight 24 ounces to a dozen.

THE CANADIAN NATIONAL RECORD BOARD

The annual meeting of the Canadian National Live Stock Record Board was held in Toronto on April 2nd. Mr. Wm. Smith, M.P., who has been chairman of the Board for eight years declined to be a candidate for the chairmanship. The following officers were elected: Chairman, Peter White, K.C.; Toronto; Committee—heavy horses—Robt.

McEwen, London; dairy cattle—W. F. Stephen, Huntingdon, Que; beef cattle—Robert Miller, Stouffville, Ont.; light horses—Robert Ness, Howick, Que.; sheep—J. M. Gardhouse, Weston, Ont.; swine—J. E. Brethour, Burford, Ont.; secretary-treasurer, J. W. Brant, Ottawa.

FARMERS' AND DAIRYMEN'S ASSOCIATION OF NEW BRUNSWICK

The forty-fourth annual meeting of the Farmers' and Dairymen's Association of New Brunswick was held at Fredericton on March 16th and 17th. Resolutions were passed asking for the establishment of stock yards and abattoirs and cold storage in the Maritime Provinces; requesting the provincial

department of agriculture to manufacture and distribute through agricultural societies tile for land drainage; asking the federal department of agriculture to establish an experimental station near the north boundary of the province; asking for the inclusion in the curriculum of the country schools a text

book on elementary agriculture; asking that an egg laying contest be commenced next November at the Experimental Station at Fredericton; recommending that poultry be marketed undrawn with heads and feet attached; requesting the provincial govern-

ment to appoint a commission to ascertain the actual cost of farm produce on the basis of an eight-hour day plus a reasonable profit.

The following officers were elected: President, H. M. Magee, Rothesay; vice-president, J. A. Goudet, St. Josephs; secretary, A. J. Doucet, Moncton.

QUEBEC SOCIETY FOR THE PROTECTION OF PLANTS FROM INSECTS AND FUNGUS DISEASES

At the twelfth annual meeting of the Quebec Society for the Protection of Plants from Insects and Fungus Diseases, which was held at Macdonald College, Que., on March 17th, the following officers were elected for the present year: President, Professor W. Lochhead, Macdonald College;

vice-president, Rev. Father Leopold, La-Trappe, Que.; secretary-treasurer, Professor B. T. Dickson, Macdonald College. It was decided that the society, so far as funds are available, will continue to help in aiding investigations concerning entomological and phytopathological questions.

ST. FRANCIS AYRSHIRE CLUB.

An Ayrshire Club for the counties of Compton, Sherbrooke, Stanstead, Richmond, and Wolfe, P.Q., was organized by about thirty Ayrshire breeders on March 12 at Lennoxville. The officers elected were:—

Honorary president, John McClary, Lennoxville; president, M. Ste. Marie, Compton; vice-president, B. J. Taylor, Ayer's Cliff; secretary-treasurer, Geo. B. Fish, Ayer's Cliff.

CONVENTION OF CLAY WORKERS AND DRAINAGE MEN

The Western Ontario Clay Workers' Association and the Ontario Farm Drainage Association held a joint convention at London, Ontario, during the last week in February. The officers elected for the Western Ontario Clay Workers' Association are: President, Wm. McCreadie, Lyone; vice-presidents, Alfred Wehlann, Cairo; H. H. Hallatt, Tilbury, and R. T. McDonald,

Brigden; secretary-treasurer, G. A. Armstrong, Fletcher.

The Ontario Farm Drainage Association elected the following officers: President, S. W. Hyatt, Mt. Brydges; vice-presidents, J. E. Jackson, Downsview; W. Walsh, Florence; secretary-treasurer, Fred L. Ferguson, O. A.C., Guelph.

CREAMERY CONFERENCE AT GUELPH

The conference of butter makers and creamery men held at the Ontario Agricultural College, Guelph, the last two days of March and the first of April was notable chiefly because several distinct and important advances were made toward improving the creamery butter of Ontario. Briefly these were: Strong recommendations to have cream graded and paid for on a quality basis; the pasteurization of cream at a temperature of 170° F. held for at least ten minutes; the grading of butter; and more co-operation among the cream producers, butter manufacturers and buyers of the Ontario Department of Agriculture. The latter recommendation concerns instruction work. There were also

resolutions asking the Ontario Department of Agriculture for more help, and one against any more indulgence to oleomargarine manufacturers in Canada.

Practical lessons on grading cream and butter were an important feature of the conference. Those taking chief part in the practical work were Messrs. McMillan, Smith and Sproule, while addresses and discussions were held by Professors Lund and Dean of the college staff. A resolution was passed asking that a similar conference be held next year and as a result of the one just held we may expect a long strong pull to put Ontario butter at the top of the list during 1920.

MANITOBA CATTLE BREEDERS' SALE

The success of the Manitoba Cattle Breeders' sale which was held at Brandon in March was interfered with by storms which prevented a number of the listed animals reaching Brandon as well as the arrival of buyers from the more western provinces. Fifty-seven bulls including Shorthorns, Herefords and Angus brought an average price

of \$231.32 per head. Eighteen of the Shorthorn purchases were secured by the Live Stock Branch of the federal department of agriculture. These will be distributed amongst clubs organized in accordance with the policy of the Branch for improving cattle stock in outlying districts.

MANITOBA BEEKEEPERS' ASSOCIATION

At the annual meeting of the Manitoba Beekeepers' Association a resolution was passed petitioning the provincial government to introduce an amendment to the Manitoba Foul Brood Act compelling all beekeepers to register with the Department of Agriculture

each year not later than April 1st with a penalty for neglect. The following officers were elected: President, G. Gunn, Lockport; vice-president, B. Brewster, Green Ridge; secretary, G. Reddin, Elmwood.

SASKATCHEWAN CATTLE BREEDERS' SALE

A public auction sale of Shorthorn, Hereford, and Aberdeen Angus cattle was held by the Saskatchewan Cattle Breeders' Association at Regina in the third week of March. More than four hundred animals including bulls and cows were sold at satisfactory prices. Previous to the announcement of the sale the animals were judged, the Shorthorns by Professor G. E. Day,

secretary of the Dominion Shorthorn Breeders' Association, the Aberdeen Angus by Mr. J. G. Robertson, Live Stock Commissioner for Saskatchewan, and the Herefords by Professor A. M. Shaw of Saskatchewan University. The following table shows the average prices received for the animals of the different breeds:—

Breed		Average price		Average price
Aberdeen Angus.....	Male.....	\$ 205 45	Female.....	\$ 228 10
Herefords.....	"	304 00	"	251 00
Shorthorns.....	"	242 00	"	276 00

The highest price received was \$1,555 which was duplicated. The animals bringing

this value were the Shorthorn cow Daffodil Second and the Hereford bull Victor Britisher.

BRITISH COLUMBIA HONEY PRODUCERS' ASSOCIATION

BY WM. J. BONAVIA, SECRETARY, DEPARTMENT OF AGRICULTURE

The British Columbia Honey Producers' Association was incorporated under Part II of the Agricultural Act of 1915, and amendments, on the 1st March, this year. The headquarters are at New Westminster and the annual membership fee is \$1.

This association has been incorporated by the leading beekeepers in this province to organize the beekeepers in the various districts into a strong co-operative body for the marketing of honey produced by members. They are also interested in the educational side of the matter, good work already having been done this spring in the Lower Fraser Valley by lantern lectures and the holding of meetings at various points.

The organization has met with instant success from the start and has a membership of several hundred at the present time. The association has been largely responsible for amending legislation in connection with the "Foul Brood Bees Act, 1911", important amendments having been put through at the present session in connection with the labelling of receptacles containing B.C. honey.

The secretary-treasurer of the Association is Mr. W. M. Turnbull, Sullivan Station, B.C., who is also assistant chief inspector for the Department in the Lower Mainland district.

The objects of the association are:—

- (a) To promote and encourage the keeping of bees by the most suitable methods for their profitable management.
- (b) To assist members in disposing of their produce to the best advantage by the adoption of uniformity in the grading, packing, and labelling for market.
- (c) To obtain the most advantageous terms for members in the purchasing of bee supplies.

- (d) To effect the standardization of such bee appliances as may be found most suitable for the province.
- (e) To promote and regulate exhibitions of bees, honey, wax, etc., and arrange for the judging of same.
- (f) To promote the growing of nectar-bearing plants.
- (g) To aid in the dissemination of reliable and practical information with regard to the bee industry, and further its progress in every possible way.

WOMEN'S INSTITUTES AND THE HOT SCHOOL LUNCH

Women's institutes everywhere are endeavouring to secure the adoption of a system for supplying hot lunches for the pupils of the public schools. At the Alberta Women's Institute Convention held in March the subject received special attention. The subject was emphasized by the president, Miss Isabel Noble in an address in which it was pointed out that the hot lunch is one of the big school problems of the day. The chief difficulty, it was stated, seems to be to make the people realize that the children would have better health, would learn faster, and enjoy school far more if a hot lunch were served.

To establish a hot lunch in any school it is necessary to have the united effort of the pupils, the teacher, the parents, and the trustees. The children are always delighted with the idea; the teachers are now especially trained in the normal schools for this work. To make the lunch a success it is first necessary to have an enthusiastic teacher. Miss Noble referred to the teacher in her own school district. This teacher serves a hot

lunch every day. She has an attendance of eighteen children. One family brought the milk, another cocoa, and another sugar, while she furnished the potatoes, butter, salt, pepper, flour, soda, and bought Campbell's soups when soup was served—also furnished the utensils. Each day cocoa and either baked potatoes, a custard or a soup (tomato, cream, or pea soup) was served. At recess she put the potatoes on to bake, and the milk on to heat. At noon she split and buttered the potatoes. If serving soup, she mixed the butter and flour and hot milk at noon, added the tomatoes or other vegetables and had a very lovely hot dish. When serving the children marched round the room, got their dishes from a table then marched to the stove where the teacher served them and back to their desks. The children brought their own cups, plates, and spoons from home. The children did much better work in the afternoon than they used to do before the hot lunch was served, and attendance was more regular. The cooking was done on an old-fashioned school heater.

WOMEN'S INSTITUTE REST ROOM

At the present time there are thirty Women's Institute rest rooms and community homes in Alberta; of this number approximately one-third of the institutes own their own building. The necessary funds have been secured by soliciting local firms and individuals, also by giving concerts, entertainments, etc. In a few instances the rest room property is worth from \$3,500 to \$6,000; however, the valuation of the usual rest room is from \$1,000 to \$2,000.

The majority of the Women's Institutes use rented buildings or rooms for their rest

rooms. The yearly rental ranges from \$36 to \$400. The municipality in which the rest room is situated sometimes gives a grant, in one case the municipality pays the yearly rent account in full on the condition that the Women's Institute furnishes and cares for the rooms. A number of municipalities supply a room in the municipal hall to be used as a rest room; the institute usually takes the caretaking and supervising responsibility.

NEW PUBLICATIONS

ONTARIO

Appendix to the Annual Report of the Agricultural Societies of 1919 gives the results of competitions in standing field crops and prize winning grain at winter fairs, Canadian National, and Central Canada Exhibitions.

ALBERTA

School Fairs is a bulletin out-lining the plans under which school fairs are conducted in the province of Alberta together with instructions to local committees, teachers, and pupils regarding their part in such fairs.

BRITISH COLUMBIA

Raspberry Culture Circular No. 55 New Horticultural Series. This circular gives very complete information regarding raspberry culture in British Columbia. It gives instructions on preparation of land, planting, cultivating, intercropping, harvesting, prevention of disease et cetera.

Hints on Egg-Hatching, Bulletin No. 25 is a two-paged leaflet on artificial and natural incubation.

MISCELLANEOUS

The Agricultural Index, 1919 by H. W. Wilson Company, New York, N. Y., is a subject index to a selected list of agricultural periodicals and bulletins covering the year 1919.

Rural Science Reader, by Professor S. B. McCreddie, is published by D. C. Heath and Company, Boston, Mass. This book is the first of the Rural Education series planned and written to serve the needs of children who are to spend their lives in the open country and in rural villages.

Directory of County Agents, Farm Bureaux and Their Co-Workers is a new volume compiled by William G. Wilson, of Cambridge, Mass. This book contains the names and addresses of the agricultural extension workers in the United States and in Canada, showing the various official positions held and indicating the services given.

Agricultural Economics, by H. C. Taylor, is a new volume in the Social Science Text-book series published by the MacMillan Company of Canada. This book is intended for the student and the farmer interested in the study of economic principles underlying effective organization of the farm, as well as for the statesman interested in establishing laws and institutions for the development of agriculture.

NOTES

Mr. Cecil Tice, B.S.A., has been appointed to succeed Mr. H. O. English as soil and crop instructor in the Department of Agriculture of British Columbia.

In the multitude of activities of the Canadian Farm Women of Alberta, prominence is to be given to health work, economics, young people's work and industrial problems, rural education and politics.

The committee sent to England to select imperial veterans for settlement in Canada has already approved approximately one hundred applicants. Of this number thirty-five per cent have had experience in farming.

Mr. H. E. Upton, assistant poultry instructor, is severing his connection with the British Columbia Department of Agriculture to take the position of chief poultry supervisor under the Soldier Settlement Board for British Columbia.

Mr. W. A. MacLeod, editor of the Public Service Monthly, has been appointed associate editor of *THE AGRICULTURAL GAZETTE* of Canada for the Saskatchewan Department of Agriculture.

The Canadian Ayrshire Breeders' Association have decided to discontinue publishing the Ayrshire Breeders' Annual and to replace it with a monthly paper which will give news of important transactions with Ayrshire cattle including the more important milking tests.

The Department of Soldiers Civil Re-establishment are giving their farm students the advantage of association with cows of superior quality. From March 1st to 15th, five Holstein Friesian cows owned by this Department qualified in the Holstein Friesian Record of Merit.

In order to encourage the use of better sires in Kent county the Agricultural Society of Blenheim, Ontario is offering three cash prizes of \$25, \$15 and \$10 for the best pedigree, beef breed bulls purchased after January 1st, 1920 and exhibited at the Blenheim fall fair.

Eastern importers of Persian Karakul sheep are impressed with conditions for sheep farming in British Columbia and state that this valuable species can be successfully raised in that province. The herd in Alberta

is doing well and it is expected that even better results will be obtained in the country around Kamloops, B.C.

Mr. J. G. Archibald, associate professor of chemistry at the Nova Scotia Agricultural College has resigned his office to accept a position on the staff of the International Nickel Company at Copper Cliff, Ontario. Mr. Archibald has during the past two years been the Nova Scotia associate editor of *THE AGRICULTURAL GAZETTE*.

The new Secretary of Agriculture for the United States is E. T. Meredith, who has taken the place of D. F. Houston, recently made Secretary of the Treasury. Mr. Meredith was the prime mover in the formation of the Farm Bureau system and he is the publisher of a successful farm paper in Iowa.

Under the provisions of the provincial Agricultural Act 1915 the British Columbia Honey Producers' Association has been incorporated. In accordance with the requirements of the Act not less than twenty-five persons can subscribe as members of the association. Their headquarters are situated at New Westminster. The annual membership fee is one dollar.

Egg Laying contests will be continued next year by the Experimental Farms System at the Central Experimental Farm, Ottawa, and the experimental farms and stations at Charlottetown, P.E.I.; Nappan, N.S.; Cap Rouge, P.Q.; Brandon, Man.; Indian Head, Sask., and Lethbridge, Alberta. These contests will begin on November first and will continue for the full fifty-two weeks.

The Department of Agriculture for Alberta has purchased in Scotland the stallion Craigie Masterpiece for use in the province under the vote made for this purpose by the provincial legislature in 1919. This animal

weighs about 2,100 pounds, is rising seven years old and has been one of the real good breeding horses in Scotland. The price paid was 2,500 pounds sterling.

A section of the student body of Macdonald College have formed themselves into a club known as Macdonald College Canadian Club. The object of the club is to discuss and study subjects of general interest more especially those bearing on the British Empire, Canada, and particularly Canadian agriculture. It is planned to hold weekly meetings and to have authoritative speakers address the members from time to time.

A conference of representatives of the growers, shippers, dealers and consumers of potatoes and onions together with provincial officials was called together in Ottawa by the Minister of Agriculture to consider the advisability of establishing compulsory grading rules with respect to these two crops. After a full discussion of the subject the principle of compulsory grading was approved and a motion adopted recommending that legislation be enacted establishing definite prescribed grades and the use of brands in connection therewith.

A short course recently opened at Charlottetown, P.E.I., for female dependents of soldier settlers on the land includes lectures by instructors of the Prince Edward Island Department of Agriculture, and demonstrations by experts in various branches of household science. The course includes visits to the Experimental Farm and the co-operative egg circles, demonstrations at the abattoir in the preparation, plucking, dressing, and packing of fowls, and pork curing, cooking, and other farm activities. Lessons also are given in such home activities as knitting, sewing, etc. The smooth working of the home arrangement has much to do with fostering a feeling of contentment and the Soldier Settlement Board is doing an excellent work in instructing the farm women in home management.

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PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty, International Institute Commissioner, Department of Agriculture, West Block, Ottawa.

GENERAL INFORMATION

415.—The Use of Aerial Photography in Agricultural Instruction.—BOUCHÉ, H., in the *Comptes rendus des Seances de l'Academie d'Agriculture de France*, Vol. V, No. 10, pp. 354-355 and 358-362, Paris, March 12, 1919.

The use of aerial photography in agriculture and agricultural instruction may be of great importance—repairs of the land, details of the partition of the land and of the crops on an estate, description of the trees in orchards and other plantations, study of the form and utilization of land according to its geological formation, relief of the land, of the hill sides, etc. In the districts devastated by war aerial photography might be used to estimate the damage done.

CROPS AND CULTIVATION

427.—Soil Aldehydes. A Scientific Study of a New Class of Soil Constituents Unfavourable to Crops, their Occurrence, Properties, and Elimination in Practical Agriculture.—SKINNER, J. J., in the *Journal of the Franklin Institute*, Vol. CLXXXVI, No. 2, pp. 165-186; No. 3, pp. 289-316; No. 4, pp. 449-480; No. 5, pp. 547-584, No. 6, pp. 723-741. Philadelphia, 1918.

The author investigated the presence of aldehydes in 74 samples of soil including 14 garden soils and 60 field soils of the same type and from the same locality, 30 of these were classed as unfertile and 30 as fertile. He found aldehydes in 5 of the garden soils and 12 of the field soils, most of which were unfertile. Before the author's investigations some aldehydes, especially vanillin and salicylic aldehyde, had been found in the soil. The author studied their action on the development of cultivated plants, (a) in water; (b) in nutrient solutions; (c) in pots; (d) in the field. He also studied the action of four other aldehydes: heliotropine, benzaldehyde, formaldehyde and paraformaldehyde—on water and nutrient solution

cultures. These cultures, numbering 76, contained sodium nitrate, monocalcic phosphate and potassium sulphate in varying proportions.

Results.—All the aldehydes tested proved injurious to water cultures even in relatively small quantities, in the following increasing order:

Vanillin.—Was more injurious to the roots than the tops, but its ill effects decreased in the presence of a large quantity of sodium nitrate.

Salicylic aldehyde.—Its harmful effect was lessened by solutions rich in mono-calcic phosphate and in the presence of calcium carbonate.

Benzaldehyde.—At the rate of 25 millionths it had an injurious effect which was not attenuated appreciably by any nutrient salt.

Heliotropine.—Was so harmful to plants that it was difficult to determine any difference in the attenuating effect of the various nutrient solutions.

Formaldehyde.—Proved equally injurious in all the nutrient solutions.

Paraformaldehyde.—Its injurious effect was equal to that of formic aldehyde, but was lessened by monocalcic phosphate.

In the pot and field experiments salicylic aldehyde and vanillin exercised no harmful effect on good productive, well-drained soils intensively cultivated, as these conditions give the soil an oxidizing power which enables it gradually to eliminate the aldehydes. On the other hand, soils containing the aldehydes were not very productive and had not been kept in good condition. This prevented the elimination of these substances, the injurious effect of which was much attenuated by the application of lime or manganese compounds. The harmful effect of salicylic aldehyde could be controlled in such soils by mono-calcic phosphate, and that of vanillin by sodium nitrate.

CONCLUSION.—These results show that in practical agriculture, soils rendered sterile by the presence of certain aldehydes may be made fertile by adopting methods favourable to the oxidation of these substances. These

methods are, first of all the drainage and aeration of the soil, and, secondly the application of lime, manganese compounds or certain fertilizers.

429.—Study on the Fixation of Nitrogen by Soil Bacteria, or "Azofication".—GREAVES J. E., in *Soil Science*, Vol. VI, No. 3, pp. 163-217. Baltimore, September, 1918.

The author calls "azofication" the fixation or assimilation of nitrogen in the soil by certain species of bacteria acting alone or in conjunction.

He reviews 211 papers on this subject and abstracts the principal data concerning the distribution of the nitrogen-fixing flora (especially the *Azotobacter* genus), and the conditions under which they act. He concludes that *Azotobacter* form an important factor in maintaining the nitrogen content of the soil, although their effect cannot be definitely estimated as the figures published up to the present vary greatly. Whereas Hall (Rothamsted) and the Utah Agricultural Station estimate the amount of assimilable nitrogen supplied annually to the soil by these bacteria to be 25 lbs. per acre, Lohnis places it as high as 35.7 lbs. and Lipman holds that the quantity varies from 15 to 40 lbs. under favourable conditions.

433.—The Effect of Liming on Crop Yields in Cylinder Experiments.—LIPMAN, J. G. and BLAIR, A. W., New Jersey Agricultural Experiment Station, in *Soil Science*, Vol. VI, No. 2, pp. 157-160. Baltimore, August, 1918.

During the 20 years 1898-1918 the New Jersey Agricultural Experiment Station made in two ten-year periods, numerous fertilizer experiments on various plants grown in five-year rotation in galvanized iron tanks sunk in the earth in order to reproduce field conditions as far as possible. The objects of the experiment were:—(1) to determine the denitrification of sodium nitrate applied in large and small quantities with cow manure; (2) to determine the assimilability of nitrogen supplied by sodium nitrate, ammonium sulphate, dried blood, and cow manure respectively.

Altogether twenty sets of experiments were made, each set including three tanks. The author's note, however, deals only with the four sets in which the following nitrogenous fertilizers were applied annually:

(1) Sodium nitrate at the rate of 160 lbs. per acre.

(2) Sodium nitrate at the rate of 320 lbs. per acre.

(3) Ammonium sulphate in amounts equivalent to 320 lbs. of sodium nitrate per acre.

(4) Dried blood in amounts equivalent to 320 lbs. of sodium nitrate per acre.

In the four sets each tank received in addition each year, superphosphate at the rate of 640 lbs. per acre, and potassium chloride at the rate of 320 lbs. per acre.

At the beginning of the first ten-year period (1898) each tank received a large quantity of ground limestone. At the beginning of the second ten-year period (1908) the fertilizer was modified as described later.

The five year rotation included: (1) maize; (2) oats; (3) oats; (4) wheat; (5) timothy. During both the first ten-year periods (1898-18) and during the second (1908-1917) there were, therefore, two crops of maize, four crops of oats, two of wheat, and two of timothy. In addition a residual crop of oats (of millet in 1899) was cut to utilize more completely the nitrogen supplied.

At the beginning of the second ten-year period (spring of 1908) the fertilizer was modified. In each of the four sets one of the tanks (A) received no limestone, a second (B) received limestone only, and a third (C) limestone and green manure of leguminosae (vetch and crimson clover). This was repeated at the beginning of the second five-year rotation of this period (1913). The objects of the modification in the fertilizer were to change the soil reaction in tank B and to change the soil reaction and add to the nitrogen content of the soil at the expense of the atmosphere in Tank C.

Results.—The yield of the crop in dry matter was determined each year. During the first years it varied little in the three tanks of each set and, on an average, the differences observed decreased during the ten years. During the second ten years, when the fertilizer had been modified, the differences in the yield in dry matter of the three tanks A, B and C of each set were already very marked in the first year (1908) and became greater later on. At the end of the second ten years the A tanks without limestone, gave a much lower yield in dry matter than at the end of the first ten years, whereas the yield in dry matter of the B tanks, with limestone only, remained about the same, and that of the C tanks, with limestone and green manure, even increased appreciably. These results, therefore, show clearly the beneficial action of limestone, especially when applied with green manure.

Conclusions.—To increase yield by an abundant use of chemical fertilizers it is essential to apply systematically at the same time a sufficient quantity of calcareous fertilizer to modify the ill effects of the soil reaction which, sooner or later, follows the continuous use of superphosphate, sodium nitrate, potassium chloride, ammonium sulphate or dried blood in more or less large quantities. Some leguminosae must be frequently added as green manure in the rotation so as to maintain the supply of organic matter in the soil and to increase its content of assimilable nitrogen.

437.—Reverted Superphosphate.—JAMES, C. C., in *The Journal of Industrial and Engineering Chemistry*, Vol. X, No. 1, pp. 33-35. Easton, Pa., 1918.

The author made laboratory and factory experiments on the reversion of superphosphate in the preparation of complete fertilizer mixtures. He found that when superphosphate is mixed with lime or calcium carbonate the water soluble phosphoric acid decreases during storage, this decrease being accompanied by a rise in temperature which is greater with lime than with calcium carbonate. The decrease in solubility is rapid at first, and slower subsequently.

Field experiments showed that reverted superphosphate applied to sugar cane in upland, ferruginous, clay soil has an effect similar to that of soluble superphosphate; it also gives good results with rice. These results, and the preference of several farmers for reverted superphosphate, show that the product must not be condemned arbitrarily.

British Synthetic Ammonia Developments

(1).—*The American Fertilizer*, Vol. 52, No. 6, p. 80. Philadelphia, March 13, 1920.

It is claimed that the new French process for the production of synthetic ammonia has enormous advantages over the German Haber process, and that, in fact, it represents the greatest development ever known in connection with nitrogenous products. The improved synthetic ammonia process, which has been developed by Georges Claude at the works of the Grande Paroisse, Montereau, near Fontainebleau, differs essentially from the development given to the original Haber process by the Badische Anilin und Soda Fabrik at Oppau, near Ludwigshaven, by aiming at increasing instead of diminishing the pressure at which the mixture of nitrogen and hydrogen are constrained to enter into combination to produce ammonia. Both in Germany and in the United States the tendency has been to endeavour to bring about their combination at lower pressures rather than at higher pressures. The German original working pressure was some 300 atmospheres, and this has been reduced in present practice to some 200 atmospheres, while in the United States, it is said the General Chemical Company's modified Haber process has further reduced the pressure of combination to about 150 atmospheres.

The French process, which is based on original patents obtained by Georges Claude entirely independent of those upon which the Badische Company rely, increases the pressure of combination to 1,000 atmospheres (14,000 pounds to the square inch) without reducing the temperature at which the combination is effected. By increasing the pressure of reaction to 1,000 atmospheres the yield of ammonia is increased fourfold, up to 50 per cent, while the speed of reaction is commensurately increased. The power required to compress to 1,000 atmospheres is admittedly greater than to 200 atmospheres, but there are some essential advantages

secured, which in the final result makes the total power expended per ton of synthetic ammonia produced no larger than what is required for compression at 200 atmospheres. The plant and process have been examined by a number of British experts, who have expressed themselves as highly satisfied with the achievement of Georges Claude.

West Cumberland has been chosen as the site of the proposed new works, as the district offers the greatest advantages for large chemical undertakings. Cumberland coke is described as the richest in hydrogen, and there are the further advantages of proximity to the seaboard and an ample water supply for cooling and condensation purposes. About 25,000 acres of coal land, beginning at Maryport and running in a northeasterly direction, have been acquired. The first unit of the synthetic ammonia plant to be installed will be of sufficient size to provide yearly 50,000 tons of sulphate of ammonia.

It is contended that the successful carrying out of the scheme will make Great Britain independent of the importation of Chilean nitrate, both in peace and war, as the whole of the nitric acid, nitrate of ammonia, cyanides, and various other ammonia compounds required for commercial and military purposes will be produced in this country from synthetic ammonia at a lower price than they could be produced from the imported product.

A gratifying feature of the new enterprise is the fact that the experts concerned have been able to secure a process invented by one of the Allies rather than having to purchase from the Germans, which might have been necessary had not Georges Claude succeeded in developing not only a similar process to that of the Germans, but one claiming to have advantages over the German process.

The report of the British Nitrogen Products Committee has lately been published. It summarizes three years' work, largely voluntary, on the part of a number of scientific men here gathered together to consider the question of establishing in this country and other parts of the Empire some of the newer processes for fixing atmospheric nitrogen, in order to provide supplies of the nitrogen compounds essential for munitions and agriculture alike. It was composed of members nominated by Government Departments and the principal scientific societies, with other leading scientific and industrial specialists, and it formed a number of sub-committees to investigate different aspects of the problem.

After emphasizing the importance of nitrogenous fertilizers and the need of various nitrogen products for munitions manufacture and other industries, the report gives general indication of the relation between the older and the newer methods and processes for obtaining nitrogen products.

1 See *Agricultural Gazette*, March, 1920, page 277.

It is pointed out that the world's demand doubled in the decade 1903-13, and that practically the whole of it was met by the Chilean nitrate and the by-product ammonia industries. The United Kingdom was a very large producer of by-product ammonia, but a relatively small consumer of all forms of combined nitrogen. The bulk of the home production of by-product ammonia was exported as ammonia sulphate, but the country was entirely dependent on imports for the nitrates required in agriculture and the manufacture of explosives, as it was during the war.

The committee show that the present demands for nitrogen for agriculture in the United Kingdom are already more than double the pre-war demand and that in the future the requirements will be still greater. They consider that the maintenance of a large export trade in nitrogenous fertilizers should be an essential feature of post-war policy, since only in that way can an economic use be found during peace time for an adequate reserve of plant for a future war contingency. While much could be done by the extension and development of ammonia-recovery processes, a policy directed towards ultimate independence of imported nitrogen products would, the Committee consider, essentially involve the establishment in Great Britain of nitrogen fixation on a large scale.

Even if complete independence is not arrived at they are emphatically of the opinion that in the light of the lessons of the war national interests demand the establishment forthwith of nitrogen fixation and allied processes on a considerable manufacturing scale. Moreover, they advocate that an Imperial authority should make a careful study of the defensive requirements of the Empire, so as to decide what locations are most suitable for the establishment of the nitrogen installations required to provide the necessary supplies.

In regard to technical aspects the committee had a great deal of research work carried out, particularly on the Haber process of synthesizing ammonia and on the oxidation of the latter substance to nitric acid. Since the cost of power is an important factor in some processes of nitrogen fixation, they also investigated in detail the question whether it is possible to obtain in the United Kingdom large supplies of cheap power for the purpose.

Their conclusions point to water power as the cheapest source of power on a sufficiently large scale, and the report refers to at least one site which offers favourable prospects. The cost of generating the plant is also dealt with, and there is a long discussion of the question whether it is possible to cheapen that cost by submitting the coal to distillation and gasification processes, such as low temperature carbonization, as a preliminary to power production in order to conserve

ammonia and other by-products. The conclusion reached on this point is that in the present state of knowledge the application of carbonization and allied processes to power-generation in bulk offers no immediate prospect of reducing the cost of obtaining electrical energy from coal below the figures attainable by direct coal firing.

The report declares that high prices of coal and high rates of wages are a handicap to all by-product recovery schemes, and indicates limiting prices of coal beyond which recovery schemes are unable to compete financially with direct firing. The definite recommendations of the committee are as follows:

(a) The establishment without delay of the calcium cyanamide process on a scale sufficient to give an output of about 60,000 tons of cyanamide per annum. This should be done either by private enterprise (supported if necessary by the Government) or as a public work, and the necessary electrical energy should be obtained either from water power in Scotland or from one of the proposed large steam power stations.

(b) The establishment forthwith of the synthetic ammonia (Haber) process on a commercial unit scale and its expansion as rapidly as possible to a minimum manufacturing scale of 10,000 tons of ammonia per annum. The Committee recommends that the Billingham factory should be utilized for the purpose if such a course is practicable.

(c) The establishment of the ammonia oxidation process on a scale sufficient to produce about 10,000 tons of strong nitric acid per annum or its equivalent in nitrates.

Other recommendations include the trial on a works scale of various promising processes for the fixation or recovery of nitrogen; the continuation, under the auspices of the government for the general benefit of the country, of the researches on the nitrogen problem initiated during the war; the framing of a co-ordinated policy for safeguarding the future nitrogen requirements of the Empire, it being suggested that advisory bodies should be set up in the various parts of the Empire to furnish the Imperial authority with the requisite data; and the official collection and publication of comprehensive statistics for the nitrogen industries of the United Kingdom and for the home consumption of coal by various classes of users and industries.

The Aerial Fertilization of Plants with Carbon Dioxide.—CUMMINGS, M. B., and JONES, C. H., in *Vermont Agricultural Experiment Station Bulletin* 211, pp. 3-56. Burlington, Vt., 1918.

A detailed account is given of experiments conducted to determine the general behaviour of greenhouse plants aerially supplied with carbon dioxide in excess of that normally contained in the air. The trials were begun in 1909 and continued for seven years. Widely dissimilar types of plants were chosen, beans and peas representing the legumes;

radishes and potatoes the root and tuber crops; lettuce, Swiss chard, and endive the foliage plants of the salad class; the strawberry of the fruit crops; the nasturtium and cyclamen of the flowering plants. The work for the earlier years consisted in learning methods of procedure. The data presented are based upon results secured from 1911 on. It was found impossible to supply an excess of carbon dioxide in closed receptacles which did not subject the plants to abnormal conditions of humidity and ventilation. Hence open cases were employed in all the trials. The carbon dioxide was generated continuously, liberated slowly, and allowed to bathe the plants by dispersion. The results of the several trials are presented in tabular form and discussed. Earlier investigations along similar lines are briefly cited.

The early effect of an extra carbon dioxide dosage on beans was to stimulate the growth of the seedlings, thus producing larger plants. The later effect was to enhance the production of pods and beans and slightly to change the chemical composition of the plant by proportionally increasing the carbohydrate storage. Peas were similarly benefited. Roots responded less favourably than did most of the plants used in these trials. The results, however, were positive in all instances. Weight increments were distributed in roots and stems, but chiefly the former were affected. Treated roots and plants grew faster than the untreated ones, became edible sooner, and exhibited larger carbohydrate and smaller protein contents.

Potatoes, as a rule, grew more leaflets and more, heavier, and better tubers when dosed with carbon dioxide. Tuber formation did not begin earlier, but proceeded faster when once started. In one-fifth of the trials the untreated plants weighed less than did the treated ones. Swiss chard and endive responded to gas treatment by producing larger and heavier foliage and by maturing earlier. The trials with lettuce were less conclusive, but in a majority of instances the treatment seemed beneficial. The foliage of strawberry plants was more abundant and heavier, and the total weight and number of fruits far in excess of the production of untreated plants. Cyclamens either yielded more flowers or showed gains in weight of corns when extra carbon dioxide was furnished. Treated nasturtiums gained consistently when compared with untreated plants. The flowers blossomed earlier, were produced in greater profusion, and the total weight of the plants as well as the number and weight of the leaves were increased.

Summing up the results of the experiments, as a whole, excessive carbon dioxide dosage stimulates plant growth and consequently increases production both of total crop weight and of food nutrients. Carbon dioxide appears to function much as does a commercial fertilizer and to be, to a greater

or less extent, a limiting factor in plant growth. Plants can use advantageously more than normally occurs in the air. The chemical composition of plant life is slightly, though not materially, changed by the stimulation of carbon dioxide. The treated plants almost without exception show higher carbohydrate and lower protein contents than do those grown under normal conditions. The differences seldom exceed two or three per cent and are often less.

The optimum amount of carbon dioxide for use in open boxes where dispersion is continuous appears to be determined in the main by the plant which is under trial. Five tests were made with beans and nine with lettuce, the gaseous dosage varying in amounts from nil to 348 litres. Lettuce seemed to stand and profit by a daily bath in nearly 300 litres of carbon dioxide. The trials with beans were noted and classified, but the results indicate that the optimum is somewhat lower than for lettuce. Continuity of supply seems to be quite as important as its gross amount.

The Application of Electricity to Increase Crop Production.—MACKINNON, E., in *Science and Industry*, Vol. 2, No. 1, pp. 24-35. Melbourne, N.S.W., January, 1920.

The author begins by reviewing the progress of electro-culture up to the present time. Detailed descriptions are given of Lemstrom's methods and the Newman-Lodge high tension system. The recent advances made by V. H. Blackman and J. Jorgensen (1) are described.

Practical Results.—With Canadian Red Fife Newman has obtained increases of from 6 to 10 bushels per acre with electrified seed. Analysis also showed that the plants from the electrified seed yielded grain containing 11-15 per cent dry gluten, and the untreated seed only 10-35 per cent. Substantial increases have been obtained by different experimenters with barley, oats, potatoes, and especially with strawberries.

The Possibility of Disease Control.—There is one other aspect that promises results of considerable economic importance. It is the matter of disease control. In a set of experiments with cucumbers in 1904, J. E. Newman found all his plots attacked by Spot disease. Those plants, under the influence of the discharge, were much less affected than the others. Professor Priestley, who examined them, stated that the ravages of the disease were largely inhibited by the electrical discharge, for during one week, when the influence machine broke down, the disease progressed more rapidly under the wires, and was again checked in re-starting the machine.

A Classification of the Various Methods.—We might conveniently classify the various

¹ See *Agricultural Gazette*, August, 1917, p. 728.

methods for applying electricity in crop production into five groups, as follows:—

(1) Methods in which atmospheric electricity is collected and discharged to the crops.

(2) Methods in which electricity is generated by some machine (Wimshurst dynamo), or from some commercial supply, and distributed to growing crops.

(3) The electrification of the soil, or the plant or seed through the soil.

(4) Prolonged exposure to electric arc light, or mercury vapour lamp (rich in ultra-violet light).

(5) The electro-chemical treatment of the seed before sowing.

Use of Atmospheric Electricity.—In the first method, the electricity is collected from the air by a number of lightning conductors, either on special high towers built up for the purpose (e.g., Berthelot's at Meudon, in France), or on tall posts well insulated with very large insulators at the top. In middle and southern France, which is subject to hailstorms, lightning conductors of gilded electrolytic copper, raised 100 feet, often protect an area of about three-quarters of a mile all round each pole, and by conveying the electricity from the air to the ground, frequently disperse an impending storm. Many vineyards are thus saved, and the electricity is used in stimulating the growth of the plants so saved.

The Basty method is to collect atmospheric electricity by means of iron rods ($\frac{1}{4}$ in. to $\frac{1}{2}$ in. diameter), ending in a non-rusting point, and driven into the ground 8 or 10 inches, according to the length of the roots of the plants to be treated. For vegetables, the rods should stand about 3 feet high and for wheat about 6 feet. Action is exerted over a radius of ground surface equal to the height of the rod. Some of Lieutenant Basty's results in 1913 were so marked (potatoes, 73 per cent increase; beets, 66 per cent; hemp, 328 per cent) that the French Department of Agriculture took the matter up from the scientific standpoint.

Electrification through the Soil.—The electrification of the soil has been attempted by many experimentors for a considerable number of years. A common method is to pass a current of electricity from some external source through the soil between electrodes buried therein. In greenhouse work, not much success was obtained until the adoption of the carbon electrode, which does not react with the soil and the resulting products from electrolytic decomposition, as the earth acts as an electrolyte. A recent method that has good prospects is one in which electrodes are placed 6 inches deep along the sides of the field, and a high-tension current is sent through the soil. The seed is coated before sowing with a finely-divided non-deleterious metal. It is claimed that the cost is less than 50 cents per acre, and the net cost of the apparatus installed only \$1,250. Other investigators have examined

the result of electric treatment on the bacterial changes. It is not proposed to discuss any of the theories on this section, but those interested are referred to two articles:—

(1) Electro-culture of the Soil, by Dr. Löl, Sc. Am. Supt., 79:151.

(2) The Theory of Electro-culture, by Rob D. McCreery, Sc. Am. 120:530.

Effects of Electric Light on Plant Growth.—Experiments with lights of various kinds have been mostly confined to greenhouses where the exposure is under control, and the plants can all be subjected to the same conditions of temperature and moisture.

The electric arc light, and the mercury vapour lamp (rich in ultra-violet light) have been used, and, as a rule, the results may be summarized as follows:

Total yield is increased, quality improved, and maturity hastened.

Some plants, if too near the light, have a tendency to run to seed (e.g., cress, lettuce, spinach). Lettuce within 3 feet were killed outright. There is a greater depth in colour, and in some peas examined the stems of the treated plants were more sturdy, and showed a larger percentage of fibre.

This method must necessarily be limited in its application, though there are great possibilities with all kinds of greenhouse or hothouse work.

Electro-Chemical Treatment of Seed.—*Early Work in Australia.*—The difficulties and the expense of subjecting growing crops to the application of electricity, either continuously or at intervals during their growth, induced H. E. Fry, an electrician, to experiment with the electrification of seeds. Though this is considered a virgin field by most writers who have published his methods, experiments were carried out over several seasons in South Australia by Butterfield and by Barclay, and some work was also carried out at Hawkesbury Agricultural College, New South Wales. In South Australia, an ordinary medical coil was used to electrify the seed for three or five minutes steeped in a solution of copper sulphate. Barclay is said to have increased his yield by 40 per cent. Fry probably did not know of this work, and he was anxious to prove the practical value of his process by persuading farmers to give electrified seed a fair trial, and reserve the scientific aspect for future investigation by scientists. The methods are extremely simple, and his results have been so positive during the last few years, that there were 2,000 acres recorded as sown with electrified seed in England before 1919. His methods were spread only by farmer to farmer, mostly as the result of their own successes.

The method finally adopted is simple in practice, and requires very little equipment, though care must be taken in carrying out the whole process. It is fully described in the original article.

The general results may be summarized as follows:

(1) The electrified seed in all cases gave an increased yield in bushels per acre varying from 25 to 37 per cent. The average for the 1918 season was over 30 per cent increase.

(2) The electrified seed yielded a better quality grain ranging from 1 to 4 lbs. per bushel heavier. This means better milling quality, more flour, and less offal.

(3) The straw averaged from 2 inches to 8 inches longer than the untreated.

(4) The electrified gave stouter straw (an excess of 26 per cent of that measured), and hence could stand up better.

(5) The tillering of the plant was greater from the treated seed, and it produced more ears of wheat and barley, or panicles of oats. Thus thicker plants with longer and stronger stems gave the increased yield of heavier grain.

Can Rust be Controlled by Electrical Treatment?—At the farm of W. E. Pledge, at Elmstead, near Ashford, in Kent, a remarkable example of rust resistance was seen, which, if supported by future tests, will considerably affect agricultural practice. A field of 8 acres had been sown with red standard wheat in October, 1918, one-half treated and the other untreated by electricity, but all sprayed with copper sulphate solution to prevent rust. The land was very poor, but the treated seed produced far more vigorous plants. The untreated would return not more than the 3 bushels per acre used to sow it; whereas the treated would yield a profitable return to the farmer. The untreated was affected with rust so badly that it could be picked out readily from the treated, which was seen, on very close examination, to be scarcely affected by the disease, though it was open to infection all the time.

If electro-chemical treatment will produce rust resistance in wheat and other cereals, and possibly blight resistance in potatoes, etc., its importance can scarcely be exaggerated—the increase in production and the saving of human labour would be almost incalculable.

Dr. Brenchley reported that some pot experiments had been made over two years at Rothamstead, but that she found little difference between the plants at harvest time. Dr. Anderson, stated, however, that, although results appeared identical, it had been found that in both years, when the grain was threshed and weighed, the results were very different, as much as 25 to 30 per cent in some cases. The question of the effect of various soils was not sufficiently known, and in one year the potatoes at Rothamstead were not good. The trials at Wye for the year 1918 were reported by G. H. Garrad as a failure; but it appeared that the results from the treated seed for 1919 would be better, as the two sets were apparently level towards harvest time.

It is admitted that the rationale of the process is not yet understood, though many theories have been advanced, involving ionization, permeability, osmotic pressure, sterilization, etc. Many details require working out, but there are sufficient practical results to justify immediate use of this method of electro-chemical treatment.

442.—Comparative Water Requirements of Different Varieties of Oats: Investigations in Germany.—VON SEELHORST, C., in the *Journal für Landwirtschaft*, Vol. LXVI, Part 2, pp. 121-127, Berlin, June, 1918.

To determine the water requirement of different varieties of oats (Petkuser, Gottinger, Strubes, and Luneburger Klay) they were grown at Gottingen in plots with different moisture contents.

RESULTS:—On the whole the yield of the different varieties was in proportion to the moisture content of the soil, but differed with the varieties. At all degrees of moisture the yield of Petkuser was below that of the other varieties. The Luneburger Klay variety held first place at a moisture content of 50, 63 and 76 per cent, but at 89 per cent its yield was exceeded by that of the Strubes variety and Gottinger varieties. When the moisture content of the soil was highest the Strubes variety gave the best yield.

The absolute consumption of water (including that removed by evaporation) for the four varieties increased greatly with the moisture content of the soil; it was lowest for the Petkuser variety and highest for the Luneburger Klay and Strubes varieties.

The relative consumption of water removed by the plant (exclusively) decreased for the four varieties with the increase in the moisture content of the soil up to 76 per cent; above this value it increased greatly. In this connection the behaviour of the four varieties varied with the moisture content of the soil. When this content was 50 per cent the Petkuser variety consumed the greatest relative amount of water, at 63 per cent the Strubes variety, and at 76 per cent the Luneburger Klay variety. When the moisture content of the soil was at its maximum the Petkuser variety again consumed the greatest quantity of water.

443.—Natural Crossing in Wheat, in the United States.—HAYES, H. K., in the *Journal of Heredity*, Vol. IX, No. 7, pp. 326-330. Washington, November, 1918.

There is a certain disagreement among workers as to the possibility and frequency of natural crossing in wheat. According to Robbins it is normal in the *durum* types in dry, hot countries (as in certain parts of India) whereas self-pollination is the rule in the northern, wet countries. On the other hand, Kornicke considers self-fertilization to be predominant in the species *Triticum vulgare*, *T. durum*, *T. dicoccum* and *T. Spelta*, but admits that natural crossing is possible.

The paper under review gives the results of experiments which confirm the possibility of spontaneous crossing in *Triticum vulgare*. The varieties studied were Marquis and Bluestem (beardless), Arnautka, Kubanka, and Turkey (bearded).

By crossing a beardless with a bearded variety partially bearded F_1 hybrids were obtained, i.e., the awns were only partially developed on the upper part of the ear only. The F_2 was composed of beardless, intermediate (hybrid), and bearded plants in the ratio 1:2:1. By crossing the hairy chaffed Bluestem variety with the smooth-chaffed Marquis variety was obtained an F_1 composed entirely of hairy-chaffed plants, and a F_2 including plants with both hairy and smooth chaff in the ratio 3:1.

These results seem to show that the appearance of bearded and hairy chaff in plots sown with a beardless, smooth-chaffed wheat of certain purity and origin may be considered as a sign of spontaneous crossing. To verify this hypothesis a series of observations were made in 1917 on plots of various wheats, with the following results:

Marquis Variety (bearded and smooth):—of 320 plants, 2 had beardless and hairy ears, and 1 had intermediate characters; this proportion corresponds to 0.09 per cent of spontaneous crossing.

Various Beardless Varieties (beardless and smooth):—of 80 plants, 1 had hairy glumes = 1.3 per cent spontaneous crossing.

Preston Variety (bearded and smooth):—of 160 plants, 1 had fairly developed ears and partly pubescent glumes = 0.6 per cent of spontaneous crossing.

Hybrid Turkey x Well (bearded and smooth):—of 320 plants, 6 with intermediate characters = 1.9 per cent of spontaneous crossing.

Triticum durum and *T. Spelta*—no case of spontaneous staurogamy.

In all the varieties of *Triticum vulgare* together an average of 1.3 per cent of crosses was found. Admitting that crossing occurred to the same extent between plants of the same variety, the total double percentage, 2.6 per cent would be obtained. This would make it possible to admit that in *Triticum vulgare* spontaneous crossing may occur at the rate of 2 to 3 per cent. This would easily explain the phenomena hitherto attributed to mutation or reversion.

Breeding Timothy at Svalof.—WITTE, H., in *Journal of Heredity*, Vol. 10, No. 7, pp. 291-299. Washington, D.C., 1919.

The author presents a brief account of the methods employed in timothy breeding at Svalof, the numerous forms studied, and the results secured. Characters which have received attention with regard to variation and heredity include the length, thickness and direction of growth of the stem; the number and length of internodes; the size and colour of leaves; the length, thickness, shape, stiffness, and compactness of head;

the size and colour of glumes, the colour of anthers, and the form, colour, and size of seed; physiological characters such as hardiness and earliness; the quantity of aftergrowth and stooling ability; and disease and drought resistance. It is said to be practically impossible to secure perfectly constant strains of timothy, and in view of this fact the work of the plant breeder is believed to consist chiefly of the elimination of characters of purely theoretical interest in an effort to obtain the highest possible uniformity in practical characters.

Characters deemed desirable for a timothy variety which is to be employed in a two-year meadow include tall, not too stout, erect, comparatively stiff stems with short top internodes and relatively long base internodes, vigorous, abundant stooling power, profusion of leaves, perfectly fresh at cutting, rich aftergrowth, hardiness, highest possible resistance to rust, convenient earliness, and good development during the second year. A desirable variety for perennial pasture, on the other hand, is described as one possessing vigorous stooling power, early and abundant aftergrowth after each grazing, hardiness, highest possible resistance to rust, and highly increased longevity. Good seed production is regarded as equally important as a high hay yield, the following characters being deemed essential for this purpose: tall, stiff, compact, uninterrupted heads; big, plump, well-coloured seeds, easily removed from empty glumes and with well-attached floral glumes; and a high degree of self-fertilization.

In trials with selected sorts of timothy made during the period of 1909-1918 two new strains have been developed and distributed, Primus and Gloria which have produced approximately 12 and 20 per cent more green fodder per acre respectively than ordinary Swedish timothy.

LIVE STOCK AND BREEDING

480.—Practical Contribution to the Therapeutics of Epizootic Lymphangitis in the Horse.—RUGGERINI, G., in *La Clinica veterinaria*, Nos. 1-3, pp. 1-10 and 69-83, Milan January 15, 31 and February 15, 1919.

Amongst the diseases which, during the war, have been very widely diffused among horses, the second place, after mange, belongs to epizootic lymphangitis in the Italian as well as the other allied armies. The disease has only recently been found to be of parasitic origin, but its contagious nature has been long known.

The author briefly describes the various methods of treatment used up to the present (surgical, chemical, chemico-surgical), then deals with those applied by him to 315 horses, 180 mules and 17 donkeys at the Army Veterinary Hospital at Verona. From the

results obtained the following conclusions have been drawn:—

Among all the methods of treatment suggested for epizootic lymphangitis, that which so far seems preferable consists in combining surgical treatment of the lesions with careful antiseptic treatment. Even cases considered incurable, *i.e.*, forms of farcy with congestion, are curable if the tumours seated in the glandular masses in a relation of dependence with the primitive localizations are removed. There is no need to destroy one by one all the nodules present in the regions peripheral to the swollen glands; the extirpation of the glandular tumours diminishes the swelling of the hard nodules and prevents the formation of new ones. At the same time the treatment improves the progress of the wounds already present or derived from abscesses that are opened after extirpating the tumefied glands; even the diffused congestions begin to be absorbed after the operation, while the other lesions improve and heal.

The extirpation of lymphatic glands affected with slow inflammation by cryptococcal infiltration is fairly easy and not dangerous.

Internal, or general, curative treatment is useful as a reconstituent and general tonic.

Animals suffering from impaired nutrition should be given rich food associated with iodine-arsenical and iron treatment.

481.—Anthelmintic Treatment of Intestinal Strongylosis of the Horse.—HALL, M. C., WILSON, R. H., and WIGDOR, M., in the *Journal of the American Veterinary Medical Association*, Vol. LIV N.S., Vol. VII, No. 1, pp. 47-55. Baton-Rouge, La., October, 1918.

Experiments carried out in the biological research laboratories of Messrs. Parke, Davis and Co., at Detroit, Michigan, showed that, contrary to the accepted theory, it is not very difficult to eliminate *Strongylus* from the large intestine of the horse. The most suitable remedy is *Chenopodium* oil, which ejects 95 to 100 per cent of the *Strongylus* if administered to horses which have fasted for 36 hours. The dose should be 16 to 18 cc. given in one or more times, and accompanied or followed 1 to 2 hours later by 900 to 1,000 cc. of linseed oil. The small worms (*Cylicostomum*) are more easily ejected than the large ones (*Strongylus*) probably because the second attack the mucous membrane which the first do not. Essence of turpentine was the second best of the remedies tried. Copper sulphate and emetics were of little use.

486.—Net Energy Values of Alfalfa Hay and of Starch.—ARMSBY, H. P., and FRIES, J. A., in the *Journal of Agricultural Research*, Vol. XV, No. 5, pp. 269-286. Washington, November 4, 1918.

The investigations described were undertaken by the Bureau of Animal Industry of

the United States Department of Agriculture in collaboration with the Institute of Animal Nutrition of the Pennsylvania State College with the principal aim of determining the net energy value of starch as representing the carbohydrates. Alfalfa hay was used as roughage, chiefly to have a mixed ration not relatively poor in protein, but also to compare the results with the many determinations previously made with this fodder.

Seven respiration experiments were made with a pure-bred Shorthorn steer by means of the calorimeter. The points determined were:—(a) the digestibility and metabolisable energy (the difference between the total chemical energy of the food expressed by its combustion calory and the chemical energy lost in the faeces, urine, and combustible gases given off in the intestines during digestion) of varying quantities of alfalfa hay and a mixture of alfalfa hay and starch in the ratio 2.5:1; (b) the gas given off; (c) heat production.

By comparing the periods during which the different quantities of the same ration were administered, the increases in heat resulting from the consumption of food and the net energy value (metabolisable energy less the increase in heat caused by the consumption of the food) was calculated.

The digestibility of the rations, loss of energy in the urine, and the importance of the methane fermentation increased markedly when the total quantity of the ration was reduced. The increase in loss of energy in the urine and methane produced with the less abundant rations exceeded the decreased loss in the faeces so that the proportion of total metabolisable energy was slightly less than with the more abundant rations. The metabolisable energy of starch was 10 per cent greater than the average found by Kellner for 5 experiments; the difference is chiefly due to smaller losses in the faeces. Starch caused the usual depression in the digestibility of other foods (alfalfa hay).

The average increase in heat caused by the consumption of alfalfa was 999 calories per kilogramme of dry matter as compared with 981 calories found for this hay the preceding year, and 1169 calories in six previous experiments with three different samples. The average increase in heat caused by starch was 1,692 calories per kilogramme of dry matter, as compared with 1,248 calories according to Kellner.

The net energy value of starch was about 9 per cent below that calculated by Kellner's experiments, *i.e.*, slightly more than 49 per cent (instead of 59 per cent) of the metabolisable energy utilized by the animal.

493.—Sunflower Silage for Dairy Cows: Experiments in Montana, U.S.A.—ARNETT C. N., and TREETSVEN, O., in the *University of Montana, Agricultural Experiment Station, Bulletin 118*, pp. 75-80, Bozeman, September, 1917.

The giant sunflower of Russia, sown at the

Montana Agricultural Station in the spring of 1915 yielded, when irrigated, 36 tons per acre of green fodder which, when fed to dairy cows, either simply chopped or siloed, gave excellent results. The following year sunflowers, hoed but not irrigated, yielded 22 tons per acre of green fodder. The cows ate from 40 lb. to 90 lb. a day of young sunflower (representing about 5 per cent of the plant in flower) which proved to have a food value almost equal to that of maize fodder. To determine the food value of siloed sunflower two lots of 7 cows were subjected to feeding tests. Lot 1 received concentrates (oats, malt sprouts and bran in the ratio 5:2:3) and alsike clover hay. Lot 2 received the same ration except that part of the clover hay was replaced by siloed sunflower. At the end of 28 days the rations of the two lots were reversed and the experiments continued for a further 28 days. The results obtained were:

	Lot I	Lot II
	lbs.	lbs.
Initial average weight.....	1,072	1,081
Final average weight.....	1,083	1,087
Average gain in 28 days.....	11	6
Average daily consumption—		
Of concentrates.....	13	13
Of clover hay.....	21	12
Of sunflower silage.....		34
Average daily milk yield per cow.....	33.37	34.35
Average daily fat content of milk per cow.....	1.382	1.459

Thus, a daily consumption of 3½ lbs. of sunflower silage resulted in a saving of 1 lb. of clover hay and, at the same time, increased the milk and butter yields. The products had no peculiar taste or smell.

Egg-Laying Contests.—KIRKPATRICK, W.F., and CARD, L. E., in *Connecticut Agricultural Experiment Station, Bulletin 100*, pp. 71, Storrs, Conn., 1919.

This bulletin presents detailed reports of the annual egg-laying contests held at Storrs, Conn., in 1916-17 and 1917-18, and also averages the egg records, feed consumption, costs and profits of the third to seventh contests.

The simplified feed mixtures adopted for the fifth contest were used during the sixth and seventh and are regarded as very satisfactory. The feeds available for the seventh were of lower grade than those used in the sixth and the difference is reflected in a higher feed consumption per pound of eggs. In spite of the increased cost of feed in recent years, the difference between receipts and feed costs per dozen eggs has steadily increased in successive contests. Two charts present separately for the White Leghorns, Wyandottes, Plymouth Rocks, and Rhode Island Reds entered in the five most recent contests, the average egg production during each week of the year.

The best individual egg record in the seven years of the contests was made by a White Wyandotte which laid 308 eggs during the year 1917-18. It is stated that there are only two other trap-nests records of 300 or more eggs in all the egg-laying competitions in the United States and Canada.

497.—A Quick Method of Obtaining Accurate Individual Egg Records without the Trap Nest.—ALDER, B., and EGBERT, A. D., in the *Utah Agricultural College Experiment Station, Bulletin No. 162*, 12 pp. Logan, April, 1918

In the method described the hens are shut in the hen-house and visited every morning a little before sunrise, the hens are examined by touch and those which lay during the day registered. The examination is made externally by slightly pressing the finger at the side of the abdomen, over the pelvis bone and near its end. The hens are seized one by one at the small exit of the hen-house. At the Utah Experiment Station 2 men examined 500 hens from 16 houses in 27 minutes. In 1915, by this method, of 42,886 eggs laid at the Station, only 0.5 per cent were not registered. In a test comparing this method with that of the trap nests, 308 eggs were registered and 307 actually laid, 19 outside the trap nests. In another similar test 259 eggs were registered, 251 laid, and 15 laid outside the nests.

The method recommended is most simple, requires no apparatus, may be adopted by all, and is more healthy for the hens, which are not obliged to remain several hours in the hot, often badly ventilated trap-nests. It also facilitates the elimination of bad layers, thus increasing the profit made by the hen-run.

FARM ENGINEERING

503.—Economic Conditions of Power Farming.—TONY BALLU, in the *Annales de la Science agronomique Year XXXV*. Nos. 1-3, pp. 57-100. Paris, 1918.

All the mistakes made in power farming are due to the fact that the inventors and makers of power farming machinery were not sufficiently well acquainted with agricultural science and did not know how to adapt mechanics to the needs of cultivation. The author considers the economic conditions which any power farming machine should obey and thus enters into the field of farm management, which is derived from agricultural practice.

The best "mechanical" solution of the problems of mechanical cultivation and cultivation in general would be to have a special machine for each kind of work. This solution may be said to be found, for there are excellent machines suitable for definite classes of work (windlasses for digging-work, 20 to 40 H.P. tractors for average ploughing, small tractors of the Mesmay type for light work, cultivators of the Meyenbourg type for

breaking up the soil in spring, etc.). But were all these machines to be used on one farm, even of great extent, it would mean financial collapse owing to the depreciation, as each of the machines only works for a short period in each year. From the economic point of view the ideal would be the "single" solution, representing a limited depreciation, the depreciation on one machine being the smaller the more it is used. It is advisable, therefore, to procure machines having varied uses and which can do the most yearly work. At the present moment, *tractors* and particularly windlass-tractors and wagon-windlasses, best supply the want. The future solution seems to be *electrical*, a regional central station distributing current along the chief communal lines from which branch lines that supply electric motors.

The economical use of power farming also depends on the area and the form of the divisions of the farm. There is no need to exaggerate the difficulties met with by motor-culture in farms that are much divided, but the evil remains and the cost of the work is greatly influenced by it. Contrary to the wide-spread opinion there is no reason that power farming should be restricted to large farms. The only restriction on the use of tractors in small areas rests in the choice of the machine. Only small, very handy, low-powered machines can be used in this case. In order that power farming may develop to the fullest extent, farmers and farm labourers should be given a better mechanical training or, at any rate, what training they have should be improved upon.

The author next deals with the value and future of power farming as regards its relations with animal power. The mechanical motor is not required to replace the animate motor completely. If motor-culture brings about an increase of yield, it will lead to an increased need of teams for the work that falls exclusively to them. A certain number of draught animals have to be retained for certain work and, between them and tractors, there is an economic equilibrium that is very hard to obtain. It seems, however, that this vicious circle can be avoided up to a certain point by the almost exclusive use of oxen as draught animals, for they can rest without any disadvantage; their maintenance ration has a minimum cost, when it is exceeded they "make meat" and, for industrial farms, they are practical consumers of cumbersome residues (pulpes, etc.).

Mechanical traction has certain marked advantages over animal traction. It is above all the theoretically unlimited power that can, so to speak, be condensed in a single machine, whilst with animal traction, the number of animals in a single team cannot be increased.

The power of inanimate motors can be utilized in different ways:

(1) by increasing the tractive effort to the detriment of the speed for very heavy work (grubbing, deep ploughing, etc.);

(2) by maintaining a minimum speed; the corresponding maximum tractive effort can be utilized by towing implements working at a slight depth, but over a large surface.

(3) by increasing the speed of traction to the detriment of the pull measured at the draw-bar.

But, on the other hand, the inanimate motor is less supple, it has less elasticity as to power and not such a good grip on the land as animate motors.

The author gives the economic and agricultural characteristics of the different inanimate motors (steam, internal combustion and electric) and the economic and agricultural characteristics of the different ways of utilizing motive power in the field—as a tractor or windlass. Each type has its good qualities and defects; thus it is not surprising that in seeking mixed solutions types of machines have been proposed that are also different from those seen of recent years, and the development of power farming has not attained such a degree that it is as yet possible to decide clearly in favour of any particular proposed principle or system.

The author next deals with the influence of substituting mechanical for animal traction on agricultural technique: on (1) manuring, (2) crop rotations and (3) yields.

(1) Organic manures will diminish in quantity and the author thinks that the solution of the problem from this point of view lies in the generalization of the wide-spread methods of "cultivating without manure" based on the rational utilization of the inexhaustible nitrogenous resources that Nature provides through the medium of the Leguminosae.

(2) One of the consequences of this is the development of forage crops in the rotations (which, besides, require little labour). The forage produced is used primarily for the farm stock, the remainder being sold off the farm or used as green-manure.

Oat growing will lose its importance and that of wheat will increase. Beet-growing may possibly develop, which is desirable for the use of alcohol as a fuel.

(3) Most of the results obtained up to the present agree in showing that mechanical cultivation clearly results in increased yields. This is due to the following reasons:—Work done with more powerful means can be better done, work can be done that would otherwise be neglected and all the work can be done quickly in the desired time and when the soil conditions are favourable.

Labour is decreasing everywhere in quantity and quality; recruiting will be more easy with power farming.

AGRICULTURAL INDUSTRIES

Conference on the Production and Consumption of Sugar within the British Empire.—*Journal of the Society of Chemical Industry*. Vol. 38, No. 15, pp. 287-314. London, 1919.

This account of the conference on the production and consumption of sugar within the British Empire, held in London on July 16, 1919, contains the preliminary report of the Empire Sugar Supply (Technical) Committee with discussions of the same. The report consists of statistics on the prewar sugar position of the British Empire as regards production, consumption and the quantity, nature, and source of the sugar imported or exported by each unit of the Empire; the economic sugar-producing possibilities of each unit, the most likely localities for increased supply, and the kind of sugar required by the various consumers throughout the Empire; and technical suggestions for the development of the industry.

Unfermented Grape Juice: How to Make it at Home.—DEARING, C., in *United States Department of Agriculture, Farmers' Bulletin* 1075. pp. 32. Washington, D. C., 1919.

This bulletin gives directions for the home preparation of unfermented grape juice. Descriptions are given of the three types of these juices corresponding to the types of grapes grown in the principal grape-growing districts of the United States, and of the two general methods employed in preparing the juice.

The types of juices are (1) the northeastern type, prepared especially from the northeastern fox grape, *Vitis labrusca*, which is characterized by its relatively high content of acid in proportion to sugar; (2) the western type, prepared from the European grapes, *V. vinifera*, of the Pacific coast grape sections, which have a high sugar content; and (3) the southeastern type, prepared from Muscadine grapes (*V. rotundifolia* and *V. munsoniana*) of the Southeastern States, which are somewhat lower in sugar content and higher in acidity than the western grapes but resemble them in the transparency and brilliancy of their juices.

The cold-press method of extracting juice is considered preferable for use with the western and southeastern types and the hot-press method for the eastern type. The main steps of the process in both methods from the selection of the grapes to the storage of the final product, are outlined and discussed, and diagrams with accompanying descriptions are given of homemade grape crushers and presses of different types.

Manufacture of Farina from Potatoes.—RICHARDS, H. W., in *Journal of the Board of Agriculture*, Vol. XXVI, No. 7, pp. 700-703. London, October, 1919.

A new agricultural industry, the production of potato flour, known to the trade as farina, has sprung up in England recently. This product does not consist of potatoes dried and pulverized, but is the pure starch separated from the rest of the potato.

The part played by starch in the life activity of the potato is of great interest. The substance is built up by the wonderful chemistry of nature from the simple constituents of food and water drawn from the plant's environment. For the purpose of transport in the sap it is readily changed into the form of sugar, which is soluble and can be conveyed to one part for growth and to another part for storage in reserve. In the latter case it is deposited as starch grains of microscopic size. This explanation makes clear the advantage in allowing the haulm to die down before the potato crop is lifted, so that the sap may be withdrawn to the tubers and there deposit its strength as grains of starch.

The value of the farina industry to the farming industry is so apparent as to need little emphasis. Absorbing as it does quantities of potatoes running into thousands of tons per week, it affords a steady market of great value to those who appreciate quick sales. It is a market of wider scope than the farmer has had when supplying potatoes solely for table use, for size is not of so much importance, and potatoes which are not fit for table use can be consumed in large quantities. Further, a great economy is effected with partially diseased material which was previously wasted. As all growers are aware, some forms of potato disease leave a considerable part of the tuber quite sound, yet crops attacked this way have had to be written off in the past as a complete loss because of their unfitness for human consumption. The farina factories afford the farmer a ready market for such goods on the basis of the strict value of that part of the crop which remains sound. In other words, if one-half of each potato has been destroyed by blight, the other sound half will still fetch its value for starch making.

Again, the output of by-products from this industry will prove of use to the farmer. By means of auxiliary plant in these mills the potato residues, which still contain a valuable part of the nourishment, can be prepared as a feed for animals in a greatly improved form. Manufactured in a cooked and concentrated form it will keep in store indefinitely, and will prove a more digestible and healthy food than the raw potato, besides having a wider range of use.

In considering what are the best kinds of potatoes to grow for the extraction of farina, it may be said that the quality of the starch from different varieties need not be considered; attention is to be paid solely to the quantity of starch present. The starch content may vary very considerably, so that of two crops equally sound one may be worth half as much again as the other, because of its greater yield of starch when put through the mill. The best criterion of starch content is the density or specific gravity of the potato; the higher the density the more starch there is present. The farmer will need to take into consideration the two

questions of size of crop and density, aiming to get the highest yield of starch per acre. Of varieties grown in England the following have given the highest value in the tests made: Golden Wonder, Scottish Farmer, Evergood, King George, and King Edward. These are, therefore, the types most desirable for factory use.

The manufacture of farina is a continuous process, and the extraction of the starch is accomplished by means of grinding and washing. After two preliminary washings of the potatoes to remove the earthy matter, they are ground to a very fine pulp; this process serves to free the starch grains from the tissue in which they have been deposited. Then follow the sifting and washing processes of the starch, in order to separate the fibrous portions of the potato. Next comes the treatment which is perhaps the most vital of all, a prolonged washing by a special process, removing all flavour and discolouration and foreign matters. Finally, the operations of drying and dressing produce a fine, glistening white flour.

The factories needed must have a great floor space, and very large storage room is also used for keeping and preparing the potatoes.

Farina is principally used by the textile trades, which are the largest consumers, and very large supplies are required also for the manufacture of dextrine and various classes of gums and other products of a like nature. In addition there are many other uses for it among manufacturing chemists, some of those developed in other countries being the production of artificial sago and grape sugar.

Low Temperature-Vacuum Food Dehydration.—FALK, K. G., FRANKEL, E. M., and MCKEE, R. H., in *Journal of Industrial and Engineering Chemistry*, Vol. II, No. 11, pp. 1036-1039. Easton, Pa., 1919.

In this article a description is given of the low temperature-vacuum dehydration process originally developed for the dehydration of meat, but later employed successfully for the dehydration of vegetables and fruits as well as meat and fish. The process consists briefly in heating the meat (or other food products), cut in pieces of suitable size, to a temperature below that at which cooking or appreciable changes take place, continuously maintaining a degree of vacuum such that the vapour pressure of water at the temperature employed is greater than the pressure within the vacuum drier, thus causing boiling and evaporation of the water from all parts of the meat, and introducing a sufficient quantity of heat to evaporate the large amount of water liberated.

In the commercial vacuum shelf drier used, hot water or low-pressure steam circulates

through the shelves upon which are placed galvanized iron wire-gauze trays containing the substance to be dried. In the dehydration of meat the vacuum maintained corresponds to a pressure of 2 in. of mercury, and the temperature of the circulating fluid is kept at about 70°C (158° F.). The time of dehydration varies with the size of the individual pieces of meat used. With steaks 0.25 in. thick dehydration requires from 2 to 3 hours. The final product weighs about 28 per cent of its original weight, contains approximately 10 per cent of water, and occupies about one-half the original volume. If kept under ordinary atmospheric conditions, no perceptible chemical change has been found to occur at the end of a year.

Fish, shell fish, fruits, and vegetables have been dried by this process without difficulty and with very satisfactory results. In general, the process has been found to cause less destruction of enzymes and less loss of volatile products than with air-blast dehydration.

521.—The Physico-Chemical State of the Protein in Cow's Milk.—PALMER, L. S., and SCOTT, R. G., in *The Journal of Biological Chemistry*, Vol. XXXVII, No. 2, pp. 271-284, Baltimore, February, 1919.

The authors filtered through Pasteur Chamberland filtering tubes under pressure fresh skim milk, skim milk mixed with 5 per cent of chloroform, skim milk mixed with 0.05 per cent of formaldehyde, and skim milk mixed with lactic acid. The total protein content passing through the filters was determined in each case by precipitation with Aylmen's tannic acid reagent, and the non-protein nitrogen in the filtrates from the precipitate thus formed.

It was found that the casein-free protein of the filtrate never exceeded 10 per cent of the casein-free protein content of the original sample; generally it was below this figure. Moreover, the non-protein nitrogen of the original milk could only be partially recovered from the milk mixed with chloroform or formaldehyde.

A comparison of the results obtained by the authors with those of other workers showed the size of the pores of various Chamberland filters to vary greatly, so that conclusions from experiments including filtration must be drawn with reserve. The authors believe the albumin of skim milk to occur in the colloidal state, and that it does not form a true solution, as would appear to be the case when it passes through a filter with insufficiently fine pores. This was shown by the fact that, in their investigations, most of the proteins other than casein were held by the finer-textured filters.

PLANT DISEASES

527.—**Researches on Potato Leaf Curl in France.**—SCHRIBAUX, in the *Comptes rendus des seances de l'Academie d'Agriculture de France*, Vol. V, No. 10, pp. 356-358. Paris, March 12, 1919.

The author presented to the French "Academie d'Agriculture" a report by MM Blanchard and Perret on potato leaf curl disease.

Experiments carried out during 1918 in the Loire department have confirmed the views previously held by the two workers (1). They have concluded, from their experiments, that nitrate of soda has a certain therapeutic action on plants suffering from the disease, which is certainly the manifestation of a disturbance in the feeding of the plant. In fact, the characters of the disease are precisely those observed in all plants placed under similar conditions, but the chief cause of the trouble appears to be an insufficient supply of nitrogen, and "leaf curl" is apparently related to what is known as "nitrogen starvation". It appears from experimental evidence that the "nitrogen starvation" can date back several generations which explains why leaf curl is a transmissible disease. From this it will be seen why a tuber obtained from a badly nourished plant, planted in the same region, under similar conditions of soil, manuring and cultivation, continues to degenerate, while when removed to another region, it gives bigger yields and seems to improve. This also explains why, when left in the same region, it improves under the influence of manuring and cultivation. The two experimenters are continuing their work.

New Treatment of Wheat for Bunt.—*Science and Industry*, Vol. I, No. 8, p. 455, Melbourne, N.S.W., December, 1919.

As the result of comprehensive tests made at the Wagga and Cowra experimental farms, it is claimed that a more satisfactory method has been found of treating seed wheat for bunt than by pickling in a bluestone solution. Mr. G. P. Darnell-Smith, D.Sc., and Mr. H. Ross, of the New South Wales Department of Agriculture, after several years of laboratory tests and field experience, during which several mineral and other dry substances were experimented with, have come to the conclusion that carbonate of copper gives the best results. The method which they finally adopted of treating the seed wheat was to dust dry copper carbonate through the grain at the rate of 2 ounces of the fungicide to 1 bushel of wheat. Substantial increases in the yield per acre were obtained in comparison with pickled seed, while other advantages which the new process possesses over the established practice are said to be that:—(a) no water is required; (b) no injurious effect is caused to either the grain or the young plant,

as is the case with bluestone pickling; (c) seed wheat can be treated weeks before it is sown; (d) no damage is done to the grain if it should lie in a dry seed-bed for weeks without germinating; (e) a better germination is obtained; and (f) the process is quicker and less laborious than wet pickling.

537.—**Phytophthora Cryptogea**, n.sp., *Peronosporacea Injurious to Tomato and to Other Plants in Ireland.*—PETHYBRIDGE, H. G., and LAFFERTY, H. A., in *The Scientific Proceedings of the Royal Dublin Society*, Vol. XV, (N.S.), No. 35, pp. 487-505, Dublin, 1919.

At the beginning of the summer of 1916 specimens of diseased tomato seedlings were sent from a nursery in the suburbs of Dublin to the Seeds and Plant Disease Division of the Irish Department of Agriculture for examination. A preliminary examination showed the disease to be of a new type. A visit to the nursery showed that it had been first observed three years previously on a few isolated plants. The second year it had become worse, and the third almost half of the seedlings in the nursery were already either dead or dying. Later the same disease was found, always on the tomato, in two other nurseries and a few private gardens of the same district, as well as in different parts of Ireland. This shows it to be fairly common in Ireland; according to the authors it also occurs in England.

As a result of the disease the root system and lower part of the stalks of young plants are attacked by a rot which eventually kills them. The authors propose to call the disease "tomato foot rot."

A species of *Phytophthora* has been isolated from the diseased tissues and shown to be the specific agent of the disease. It has been grown in pure cultures. Its reproduction organs (antheridia and oogones) resemble those of *Phyt. erythroseptica* Pethyb. and *Phyht. infestans* de Bary. The fungus has, therefore rightly been placed in the genus *Phytophthora* and, as it is not identical with any of the known species (*Phyt. erythroseptica*, *Phyt. infestans*, *Phyt. Phaseoli* Thaxt., *Phyt. Arecae* (Colem.), *Phyt. parasitica* Dast., *Phyt. Colocassiae* Rac., *Phyt. Allii* Lw., *Phyt. Melongenae* Saw., *Phyt. terrestria* Sherb.), it is described as a species new to science under the name of *Phyt. cryptogea*.

The same type of disease caused by the same fungus has been observed on plants of the *Petunia* genus. It is most probable that the same fungus also causes a similar disease on *Aster* and *Cherianthus*. Artificial inoculation has shown the fungus to be pathogenic to the potato, *Gilia tricolor*, and *Fagus sylvatica*, but not to *Senecio vulgaris*, *Helianthus annuus* and *Nicotian affinis*.

The plants contract the infection in the soil by their roots. The oospores probably hibernate in the soil, though this has yet to

(1) See Agricultural Gazette, June, 1918, p. 641

be definitely proved. The disease may be avoided by growing the tomato in soil completely sterilized by heat. In many cases infested plants can be treated by removing and burning the diseased parts and planting the remaining healthy parts as cuttings in uninfected soil. If these precautions are not taken all the diseased plants will have to be burnt. The soil in which diseased seed plants have been grown should be removed, and all vessels and buildings in which such plants have been cultivated should be carefully cleaned and disinfected or sterilized before being used again.

539.—*Colletotrichum Erumpens* and *Phyllosticta Straminella*, Deuteromycetes Injurious to Rhubarb in Illinois, U.S.A.—STEVENS, F. L., in *The University of Illinois, Agricultural Experiment Station, Bulletin*, No. 213, pp. 299-312. Urbana, Illinois, 1919.

Two serious diseases of rhubarb have been discovered recently in the State of Illinois and named respectively by the author "rhubarb anthracnose" and "rhubarb leaf-spot."

The former, attributed to the pathogenic action of *Colletotrichum erumpens*. Sacc., consists in a soft rot of the petioles alone. The spots on the petioles are usually soft, watery, translucent and oval, with the chief axis placed along the length of the petiole. When the spots are more than a centimetre long, the small black stromas of the parasite appear in abundance in the centre. When the infection is advanced, all the petiole is covered with stromas and is entirely soft and rotten.

On the market, only the less serious cases seen, represented by petioles with many small spots of rot that passed unnoticed by the grower when preparing the rhubarb for market.

The disease is usually much more abundant on the old parts of the plant than on the fresh and vigorous parts, although many vigorous and saleable stalks are attacked.

The infection has been found at Champaign and Urbana (Champaign county) at

Kankakee and Bourbonnais (Kankakee county) and near Anna (Union county) it is apparently widely distributed.

The damage caused by the disease is of three kinds:—the slightest trace of disease in a bundle of rhubarb offered for sale makes it practically impossible to sell it to a sharp buyer; in the field many stalks that could otherwise be sold, have to be discarded on account of the rot; the premature death of the infected stalks and, consequently, of the leaves, weakens the normal strength of the plants.

The second disease, caused by *Phyllosticta straminella* Bres., was first found abundantly in a plot at Bourbonnais. There, nearly all the leaves had numerous spots produced by the fungus, the spots often covering more than half the surface of the leaf.

Differing from the disease just described, this one does not principally attack the old leaves, but the relatively young leaves can be seriously attacked.

Phyll. straminella particularly attacks the leaves, but it has also been found on the petioles and stems. The chief characteristics on the leaves consist in the presence of irregularly circular spots of dead tissue, with a well defined edge and a diameter varying from a few millimetres to several centimetres. The zone of dead tissue is tan coloured and often dry and cracked or torn. Close examination shows the presence of numerous very small, brown pycnidia. On the petioles and stalk, the spots are oval, quite hollow and absolutely dry. Occasionally a spot may spread the whole length of the petiole, occupying only one side or part of a side of the petiole itself.

Besides Bourbonnais, the disease was found at Urbana, Kankakee and Champaign.

When many leaves are seriously attacked by the disease, the plant is very much weakened.

The author gives information as to the morphology, cultural characters and systematic position of these two fungi.

The school-directed home garden is the most economic form of gardening for small cities, towns and the suburban districts of large cities. The child's garden becomes a center of interest of the whole family. The food is produced at the home where it is to be used and the home is beautified. As the garden ties the child's interest to the home, the visits of inspection and instruction of the garden teachers tie the home to the school. In the congested sections of large cities, home gardens are not always possible and the community school grounds or vacant lot plot must be substituted. This form of school garden usually requires a greater financial cost in proportion to the value of the crop but is still justified from the standpoint of education.—Nature Study Review.

AGRICULTURAL STATISTICS

AREAS SOWN TO WINTER WHEAT AND RYE

Countries.	Wheat.			Rye.		
	1920.	1919.	Average 1913-17.	1920.	1919.	Average 1913-17.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Belgium.....	304,000	301,000	.....	490,000	476,000	.....
Spain.....	10,050,000	10,383,000	10,085,000	1,920,000	1,807,000	1,835,000
France.....	11,369,000	10,985,000	12,703,000	1,959,000	1,810,000	2,170,000
Roumania.....	1,321,000	2,969,000	4,701,000	99,000	219,000	204,000
Bessarabia.....	667,000	902,000	1,260,000	217,000	403,000	442,000
Canada.....	776,000	714,000	811,000	.....	.....	.....
United States.....	38,770,000	50,489,000	40,170,000	5,530,000	7,232,000	3,919,000
India.....	27,501,000	23,809,000	31,930,000	.....	.....	.....
Japan.....	1,324,000	1,361,000	1,249,000	.....	.....	.....
Morocco.....	1,489,000	1,551,000	.....	.....	.....	.....
Tunis.....	1,384,000	1,190,000	1,333,000	.....	.....	.....
Total less Belgium and Mor- occo.....	93,327,000	102,802,000	104,242,000	9,725,000	11,471,000	8,570,000

PROSPECTS OF CEREAL CROPS AND SUPPLIES

In the March "Bulletin of Agricultural and Commercial Statistics" just published by the International Institute of Agriculture, it is announced that although the area under wheat in Argentina has been reduced by 12%, the harvest of 1919-20 is estimated at 214,000,000 bushels, or 16% more than in 1918-19, and 43% over the average yield from 1913-14 to 1917-18. It should be observed that considerable stocks from the previous wheat crop were in existence in Argentina at harvest time.

As regards the present state of stocks, on March 1st, 1920, there were 165,000,000 bushels of wheat remaining in farmers' hands in the United States as compared with 129,000,000 bushels at the same date in 1919, and an average of 151,000,000 bushels in the years 1910 to 1914.

The condition of autumn sown crops is favourably noted in Belgium, France, Great Britain and Ireland, while in Spain, Italy, Japan, Algeria, Morocco and Tunis, an

average prospect is reported. The weather has been adverse in the United States.

Spring work is proceeding satisfactorily in Spain, France, Great Britain, Ireland and Italy.

From British India, where wheat harvest has begun, reports are generally good. The rice crop is estimated at 2,740,000,000 bushels of rough rice, representing a yield of 12% over the average of 1913 to 1917. According to official statements, the export of wheat will not be permitted until the new crop is secured, but shipments of rice from Burma to Europe are recommencing under Government control as to quantity and destination.

Apparently the irrigated area in Egypt does not suffice for the increased production of cotton required to meet the great demand, and strong measures have been decreed against attempts on the part of cultivators to destroy their cereal crops in order to plant cotton, in the hope of realizing the current prices, almost tenfold those obtainable in 1914.

FOREIGN CROP CONDITIONS

United Kingdom.—During the latter part of March and early in April there was fine growing weather. Great progress was being made in ploughing and sowing.

France.—In the first part of April the weather was very fine. Winter cereals were looking fine and making good growth. Field operations were more advanced than usual.

Belgium.—The crop outlook is satisfactory. The weather has favoured spring operations.

Germany.—No information regarding acreage is available. The condition of wheat was considered satisfactory at the end of March, but the rye outlook was poor. Spring seeding was behind hand.

Italy.—The crops were in satisfactory condition in the North early in April. Rain was needed in the South.

Roumania.—It is reported that a large area of spring coarse grains will be planted. Cultivation prospects are good.

Russia.—Owing to continued disorder large tracts of land are, it is reported, left uncultivated. No actual reports as to seasonal cultivation or activities are coming to hand.

Tunis.—The condition of wheat was satisfactory in March and a favourable harvest was expected.

India.—Crop conditions were generally good in March.

Australia.—Early in April the prospects for the coming season were encouraging.

Argentina.—Ploughing for the next crops was commenced under favourable circumstances.

UNITED STATES APRIL CROP REPORT

The Crop Reporting Board of the Bureau of Crop Estimates, United States Department of Agriculture, makes the following estimates from reports of its correspondents and agents.

The average condition of winter wheat on April 1 was 75.6 per cent. of a normal, against 99.8 on April 1, 1919, 78.6 on April 1, 1918, and 84.1, the average condition for the past 10 years on April 1. There was a decline in condition from December 1, 1919, to April 1, 1920, of 9.6 points, as compared with an average decline in the past 10 years of 5.4 points between these dates. Upon the assumption of average abandonment of acreage and average influences on the crop

to harvest, condition April 1 forecasts a production of about 483,617,000 bushels, which compares with 731,636,000 bushels, the estimated production in 1919, and 565,099,000 in 1918.

The average condition of rye on April 1 was 86.8 per cent. of a normal, against 90.6 on April 1, 1919, 85.8 on April 1, 1918, and 89.0, the average condition for the past 10 years on April 1.

The condition of rye forecasts a production of approximately 75,841,000 bushels; last year's estimated production was 88,478,000 bushels; the 1918 crop was 91,041,000, and the average of the preceding five years 50,001,000 bushels.

THE WORLD'S CROPS OF 1919

In the annexed tables are summarized the total figures for all countries for which complete statistics for the last seven years are to hand. In the case of wheat, barley, oats and linseed the data for 1919 and preceding years in the Northern Hemisphere are added to the respective date for 1919-20 and preceding years in the Southern Hemisphere. For the other crops the totals refer only to a group of countries in the Northern Hemisphere for the year 1919 and preceding years.

On the whole, the countries for which totals are given represent, on the average for the period 1912-1916, the following percentages of the world's yield:

For wheat, 60%; for rye, 14%; for barley, 42%; for oats, 60%; for maize, 78%; for rice, 60%; for potatoes, 30%; for sugar beet, 25%; for wine, 75%; for linseed, 80%; for tobacco, 55%; for cotton, 96%.

In the case of wheat the totals given in the following tables refer to the following countries:—Bulgaria, Denmark, Spain, France, Great Britain and Ireland, Italy, Norway, Netherlands, Roumania, Sweden, Switzerland, Czechoslovakia, Canada, United States, British India, Japan, Algeria, Egypt and Tunis.

Compared with the tables given on pages 195 and 197 of the February, 1920, number of the "Agricultural Gazette," the present table includes Bulgaria, Roumania and Czechoslovakia which were not included in the previous tables, and does not include Mexico, Chili, New Zealand, South Africa, Korea, Persia, Russia in Asia, Portugal and Greece, which were included in the tables in the February number, estimates for 1919 having been made from condition reports. This accounts for the differences in the totals between the two sets of tables.

Acreage 1919 Compared with 1918 and Five Years' Average.

Crops.	1919.	1918.	Average 1913-1917.	Per cent.	
				1918=100.	Average = 100.
	Acres.	Acres.	Acres.		
Wheat.....	185,912,000	187,491,000	175,943,000	99.2	105.7
Rye.....	16,146,000	15,427,000	12,545,000	104.7	128.7
Barley.....	27,728,000	31,049,000	29,059,000	89.3	95.4
Oats.....	80,658,000	83,913,000	77,243,000	96.1	104.4
Corn.....	112,838,000	114,451,000	118,948,000	98.6	94.4
Rice.....	90,701,000	88,673,000	86,873,000	102.3	104.4
Potatoes.....	11,771,000	12,082,000	11,603,000	97.4	101.5
Flaxseed.....	8,530,000	10,598,000	10,276,000	80.5	83.0
Sugarbeets.....	1,233,000	1,109,000	1,261,000	111.1	97.8
Tobacco.....	2,032,000	1,746,000	1,462,000	116.5	139.0
Vines (wine).....	17,825,000	17,293,000	17,814,000	103.1	100.1
Cotton.....	56,612,000	57,047,000	57,709,000	99.2	98.1

Production 1919 Compared with 1918 and Five Years' Average.

Crops.	1919.	1918.	Average 1913-1917.	Per cent.	
				1918=100.	Average=100.
	Bushels.	Bushels.	Bushels.		
Wheat.....	2,408,362,000	2,567,232,000	2,496,400,000	93·8	96·5
Rye.....	251,277,000	243,456,000	231,811,000	103·2	108·4
Barley.....	611,120,000	752,946,000	694,693,000	81·2	88·0
Oats.....	2,298,604,000	2,624,432,000	2,521,551,000	87·6	91·2
Corn.....	3,159,212,000	2,652,769,000	3,017,421,000	119·1	104·7
Rice.....	3,355,666,000	2,449,418,000	3,029,316,000	137·0	110·8
Potatoes.....	1,396,048,000	1,491,579,000	1,489,065,000	93·6	93·8
Flaxseed.....	67,732,000	69,931,000	72,204,000	96·9	93·8
	Tons.	Tons.	Tons.		
Sugarbeets.....	11,718,000	11,080,000	13,342,000	105·8	87·8
	Lbs.	Lbs.	Lbs.		
Tobacco.....	1,555,602,000	1,556,374,000	1,247,484,000	100·0	124·7
	Gallons.	Gallons.	Gallons.		
Wine.....	2,377,227,000	2,254,399,000	2,172,451,000	105·4	109·4
	Bales.	Bales.	Bales.		
Cotton.....	15,879,000	15,329,000	16,579,000	103·6	95·8

NOTE.—The figures for the Southern Hemisphere represent the crops of 1919-20, 1918-19 and average of 1913-14 to 1917-18.

BRITISH WHEAT SITUATION IN 1920

(THE U.S. MARKET REPORTER, APRIL 17, 1920).

All indications point to a world-wide shortage of wheat during 1920 and a world-wide increase in the demand for that commodity. Russia is still in a chaotic state, and there is little to be expected in the way of exports of wheat and other grains for some time to come. In normal times, England and Continental Europe relied in a large measure on Russia to augment their home-grown supplies of wheat, rye, oats and barley. With Russia out of the market Europe naturally turned to the United States, Canada, Australia, India and Argentina for supplies of breadstuffs.

The United Kingdom is by far the greatest importer of wheat in the world. In 1912, the island kingdom took 203,322,000 bushels of wheat and 5,742,000 barrels of flour out of a total of world imports of 585,703,000 bushels of wheat and 23,727,000 barrels of flour. The war cut off Great Britain's supply from the Continent of Europe. During 1919, and in fact for the past three-years, the United Kingdom has received no wheat from Russia, Germany, Netherlands, Belgium, France, Italy, Austria and Roumania. In 1914, 460,344 barrels of flour and 15,970,877 bushels of wheat were imported from these countries out of total imports of 5,622,230 barrels of flour and 192,725,396 bushels of wheat. Present reports indicate that most of these continental countries will not only be unable to export wheat this season, but that some of them will be compelled to import much larger quantities of wheat and

other breadstuffs than in prewar times, provided they are able to arrange satisfactory credits.

As to the prospects for obtaining wheat from Russia, there are many contradictory stories. Coloured propaganda and accurate information are so confused that it is difficult to distinguish between them. The British Relief Mission reported that southern Russia has large quantities of grain for export variously estimated at from 35,000,000 to 140,000,000 bushels. However, even if arrangements for trade and barter are made between British merchants and the Russian co-operative societies and Soviet governments, sufficient railroad equipment is not available to move any large volume of grain from the interior of Russia to the seaboard.

This leaves England dependent on her home supply, and upon imports from the United States, Canada, Australia, Argentina, and China. The crops of Canada and the United States are, of course, as yet unknown quantities. Owing to the continued drought in Australia, the wheat crop is so light as to be acknowledged generally a partial failure. Shipments from Australia for the British Government are progressing favourably and will, it is expected, be completed by June 1st. The exports of wheat from Australia for the month ending January 31, 1920, amounted to 7,105,467 bushels compared with 738,826 bushels for January, 1913, and 210,186 bushels during January, 1919.

YIELD PER ACRE OF WHEAT, RYE, BARLEY AND OATS

Countries.	Wheat.			Rye.			Barley.			Oats.		
	1919.	1918.	Average 1913-1917.	1919.	1918.	Average 1913-17.	1919.	1918.	Average 1913-17.	1919.	1918.	Average 1913-17.
	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.
Germany.....	24.8	25.4	22.1	22.5	22.5	28.0	28.8	28.8	28.8	39.4	37.8	39.4
Bulgaria.....	16.4	10.4	13.5	9.4	13.5	21.9	11.7	11.7	11.7	23.1	10.0	19.9
Denmark.....	47.5	45.2	43.1	23.4	23.1	43.1	39.2	39.2	39.2	46.4	41.7	44.9
Spain.....	12.5	13.2	13.2	16.7	14.3	19.1	21.6	21.6	21.6	19.2	19.2	21.8
France.....	15.8	20.5	17.0	15.3	16.6	17.7	20.1	20.1	20.1	23.4	24.7	31.2
England and Wales.....	28.7	33.0	29.0	.....	.....	30.3	33.8	33.8	32.7	40.7	47.2	44.9
Scotland.....	38.5	40.7	39.6	.....	.....	36.6	37.0	37.0	36.6	43.8	47.8	45.1
Ireland.....	35.2	36.1	37.3	27.2	27.1	29.3	43.5	45.2	44.6	55.9	60.4	58.5
Italy.....	16.1	17.0	15.0	16.9	19.4	17.0	17.3	20.3	16.0	28.9	35.2	26.0
Norway.....	26.2	26.5	23.0	26.9	27.7	22.6	33.8	36.1	34.0	41.5	45.4	43.8
Netherlands.....	37.2	36.0	36.9	29.2	27.1	26.6	45.9	43.9	45.4	.....	.....	.....
Roumania.....	17.1	4.6	16.2	16.2	4.6	22.1	22.1	3.7	19.0	23.4	57.7	24.7
Sweden.....	27.4	23.6	28.6	25.2	20.9	31.2	25.5	25.5	31.8	40.9	30.2	37.2
Switzerland.....	27.1	34.9	32.9	31.1	25.8	34.2	29.9	29.9	36.3	45.7	56.4	58.8
Czecho-Slovakia.....	18.0	12.8	26.3	17.7	13.4	25.6	23.4	15.8	36.8	30.2	21.8	47.8
Canada.....	10.0	11.0	19.9	13.5	15.2	19.1	21.3	24.5	14.5	26.3	28.8	36.5
United States.....	12.8	15.6	15.1	12.5	14.2	15.9	22.3	26.3	25.6	29.4	34.7	32.8
India.....	11.7	10.4	11.6	.....	.....	.....	31.2	31.2	27.5	43.6	40.7	40.9
Japan.....	21.7	22.3	21.3	12.7	.....	10.8	20.8	20.8	13.0	18.6	34.6	23.6
Algeria.....	7.4	15.5	9.1	.....	.....	.....	29.4	29.4	29.2	.....	.....	.....
Egypt.....	.....	25.3	11.0	.....	.....	.....	6.1	11.0	6.3	25.5	26.8	21.0
Tunis.....	6.2	8.6	19.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Averages.....	13.2	14.3	15.0	15.6	15.8	18.5	22.1	24.2	24.0	28.6	32.0	33.3

THE CONDITION OF AGRICULTURE IN GERMANY

(U.S. COMMERCE REPORTS NO. 77, APRIL 1ST, 1920).

The chief grain crops of Germany are rye, wheat and oats. The pre-war crops amounted to about 482,000,000 bushels of rye, 171,000,000 bushels of wheat, and 632,000,000 bushels of oats annually. The annual production of potatoes averaged about 2,000,000,000 bushels. During the war the shortage of labour, fertilizers and work animals caused a gradual decline of yields. These influences were also felt throughout 1919 when the yields were as follows: rye, 262,800,000 bushels, wheat 85,866,000 bushels, oats, 284,000,000 bushels, potatoes, 909,000,000 bushels.

Since the armistice Germany has obtained from abroad under an arrangement with the Entente, about 800,000 tons of wheat, flour, rye, beans, and barley, of which about 600,000 tons came from North America and 200,000 tons from Argentina. In December, 1919, Germany again began to buy wheat from Argentina, but because of financial difficulties, only a limited quantity—something less than 200,000 tons (which is now afloat)—was purchased.

Russia, whose markets are still closed to Germany, was the principal source of grain supply before the war, contributing about 50 per cent. of all Germany's grain imports. During the last year before the war Germany bought 36 per cent. of its imported wheat from Russia, 23 per cent. from North America, 20 per cent. from Argentina, and most of the remainder from Roumania and Austria; 40 per cent. of pre-war imports of corn came from Argentina and 60 per cent. from North America.

Roumania is not now exporting to Ger-

many; the wheat crop there is reported short, but there is said to be a surplus of other grains. Because of the more favourable exchange situation, Germany could buy wheat much more advantageously from near-by Russia and Roumania if these markets were open.

The German Government's food experts state that Germany's crop prospects for 1920 are fairly good, making allowances for deterioration of soil through underfertilization during the war, shortage of work animals, and labour unrest. The farm labour situation is complicated because of the spread of the 8-hour plan. The Ministry of Agriculture is supporting the idea of a federation of farm labourers on the 8-hour basis. This plan is opposed by the farmers.

Work horses on the farms are estimated to be short 20 per cent. of pre-war figures; there is an estimated 40 per cent. shortage of cows and steers. The shortage of pigs is felt most keenly of all, as it is estimated that there are now in all Germany less than 8,000,000 swine, as against 25,341,272 in 1914. The number of pigs, however, is increasing faster than the gain in horses and cattle. According to published Government statistics, the horses, cattle, sheep, goats and poultry in Germany did not decrease materially during the first 2 years of the war; swine, however, decreased from 25,341,272 on December 1, 1914, to 17,000,000 by December 1, 1916; on this latter date there were in Germany about 21,000,000 cattle; 5,000,000 sheep, 3,300,000 horses and mules, 4,000,000 goats, and something over 65,000,000 fowls.

LIVE STOCK STATISTICS

TURKEY

(FROM U.S. COMMERCE REPORTS, APR. 6, 1920).

There are very few cattle in Turkey now as compared with 1913. Among the causes of the depleted numbers are the past and present requisitions for military purposes, some cattle diseases, and greatly diminished reproduction. Taking these factors into consideration and subtracting the territories

of Mesopotamia, Palestine, Syria, and Arabia, the Minister of Agriculture estimates a postwar decrease of over 40 per cent in the number of farm animals.

A live stock census for the years 1913 and 1919 disclose the following approximate situation.

Kind of Animals.	1913.	1919.	Kind of Animals.	1913.	1919.
	Number.	Number.		Number.	Number.
Buffaloes.....	300,000.	378,000	Mules.....	144,600	85,000
Oxen.....	2,397,348.		Donkeys.....	1,373,700	825,000
Bulls.....	175,085.		Sheep.....	13,347,750	11,200
Cows.....	2,501,000.	3,740,000	Lambs.....	5,373,800	
Calves.....	1,158,494.		Goats.....	14,424,180	2,065,000
Horses.....	506,750.		Angoras.....	2,039,000	
Ponies.....	204,000.	630,000	Camels.....	314,000	95,000
Draft and burden horses..	339,430.		Miscellaneous.....	30,000	18,000

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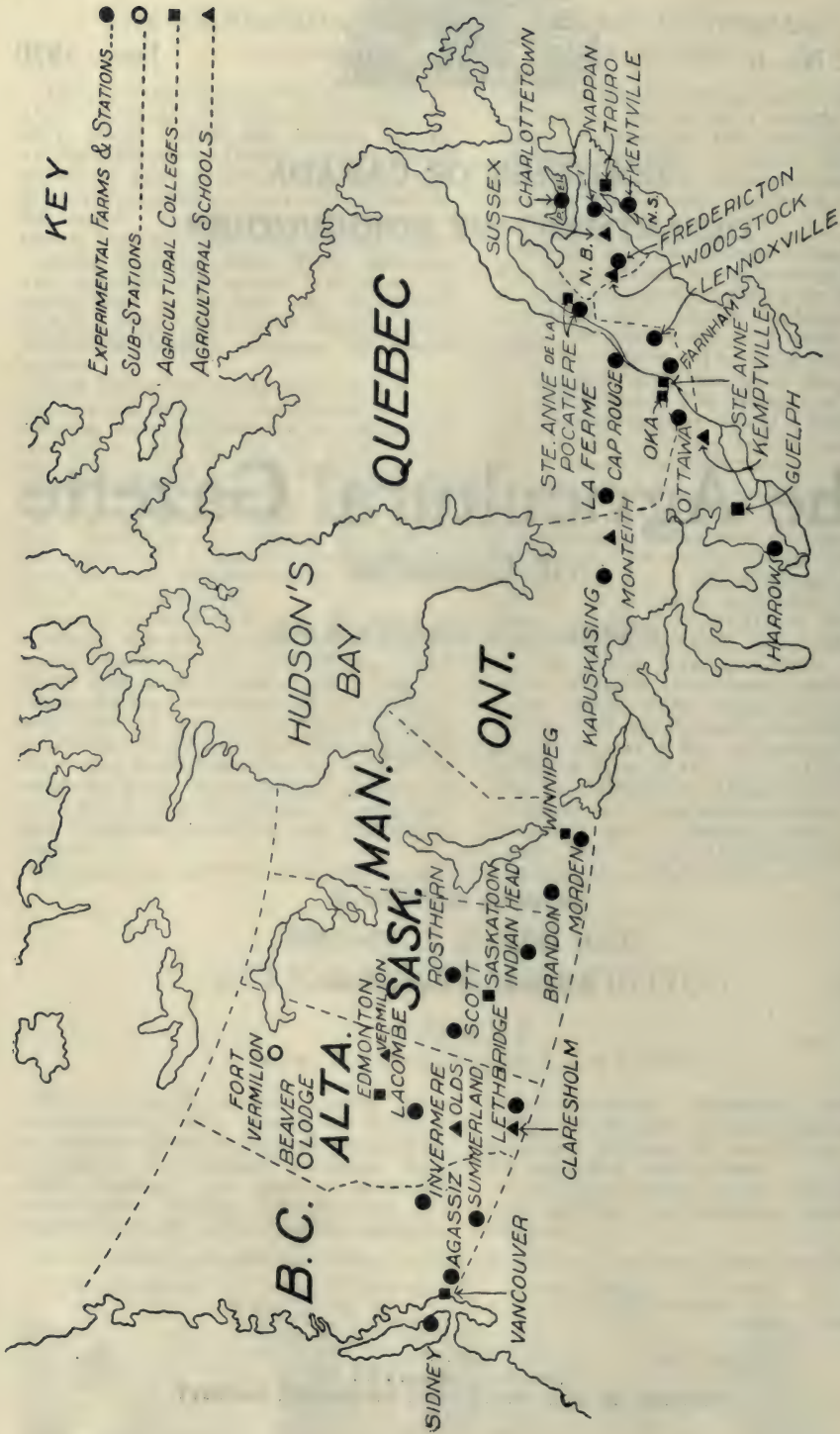
DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE

The Agricultural Gazette of Canada

EDITOR: J. B. SPENCER, B.S.A.

Issued by direction of
THE HON. S. F. TOLMIE
Minister of Agriculture

OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920



MAP OF CANADA SHOWING THE LOCATIONS OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

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THE STATUS AND AIMS OF AGRICULTURE

IN bringing the estimates of his department before Parliament, the Honourable the Minister of Agriculture made a clear and concise statement of the value of agriculture to the country and of the aims that should be sought. In doing this Dr. Tolmie reviewed in brief the objects and proceedings of the different branches. He further pointed out that by adopting improved methods of crop and stock production the wealth of the country would be advantaged to an extent that was almost incalculable.

At the outset of his address the Minister said that a survey of the situation showed that no less a sum than \$7,379,299,000 was invested in agriculture in Canada. The land under field crops in 1919 was 53,049,640 acres. The value of the products in the same year amounted to \$1,975,841,000. Comparing this with the value of other industries and our natural resources showed that agriculture in its total exceeded the others in value by billions of dollars. While there had been an increase in the acreage of wheat production, there had been a decrease in the yield per acre in recent years, excepting only 1915, which was an exceptional year, the conditions being virtually ideal. From these foundation statements, the Minister passed to a general review of what has been done and what it is advisable to do towards the enhancement of production. He strongly advocated mixed farming with live stock as a basic factor. He referred to what Great Britain has accomplished with a very much smaller area than Canada possesses. "There is," he said, "great necessity in this country for a vigorous and continuous campaign of agricultural education along the lines of better methods of farming, better live stock, better seeds, and better markets."

Without turning over one fresh acre of land great results might be brought about by improved methods. Taking the figures of 1919, if, for instance, there had been an increase of three bushels per acre as a result of improved methods of fall wheat cultivation, there would have been an accretion of \$3,976,206. In the same year a similar increase in spring wheat would have brought a further addition of \$104,075,907. Nor is it alone in wheat that by better methods these enhanced values would be brought about, for the same argument applies to all manner of field crops. Especially mentioning potatoes, the Minister pointed out that an increased yield of fifty bushels per acre would have given an increased cash value of \$38,891,433. The Minister confirmed his estimates of added values that would follow improved methods by referring to results achieved by experiments on the

Government farms. The use of pedigreed seed and of clean seed free from weeds and foreign grain had given an increase of ten per cent. In potatoes the use of disease-free seed had produced an increase of from fifty to one hundred per cent. Further, by rotation of crops, by thorough cultivation, by the use of commercial and farm fertilizers, very largely increased production has been secured. This all indicated, not only the value of the Experimental Farms, but also the results that may be achieved by better farming methods.

After pointing to the immense area of virgin soil in Canada, the Minister suggested that a little more discrimination should be shown in bringing in the kind of men who are willing to work and settle on our farms. Greater stabilization was required.

Considerable shifting of live stock had been necessary in consequence of the high prices of grain and a lack of faith on the part of the farmer in present market conditions. The farming industry has been very slow in taking up sheep rearing. Experiments indicate that both hog raising and sheep raising would show satisfactory results by the adoption of improved methods. The Minister went on to illustrate what might be achieved in this way, quoting both facts and figures. The illustrations he had given would imply an increase in the value of field crops of \$233,211,082, and an increase in the value of live stock of \$275,308,666, as a result of improved methods, making a total of \$508,519,748, or more than a quarter of the total national debt per year, and without turning over a single fresh acre.

The Minister went on to speak of the efforts that are being made to supply the British market with what is known as the bacon type hog. The result achieved proved the value of agricultural propaganda of the right kind. Individual cases had abundantly shown what might be achieved by better farming. Large sums had

been paid and would always be paid for the best stock. There was a market at the present time for every animal that possessed the right kind of breeding and had been subject to the right kind of feeding and attention. "We must learn to feed more liberally," said the Minister, following with an illustration of the result of an experiment at Nappan Experimental Farm, Nova Scotia, where by careful feeding a number of heifer calves when they came into their lactation period produced fifty per cent more milk than their dams had done.

Having referred to special achievements in cultivation, both in crop and live stock production, that had come under his observation, especially in Western Canada and the western states, the Minister touched upon the great value of the silo system. While corn had perhaps been given the most prominence among silage plants, in those areas that are most liable to frost it was not so good as sunflowers, which would stand a temperature of 27 degrees, or 5 degrees of frost. Experiments had shown that two and a half tons of sunflower ensilage is equal in feed value to a ton of alfalfa hay, and a ton of alfalfa hay is equal in feed value to nearly a ton of bran. This cultivation of the sunflower opened up a vast field for the production of cheap feed for the maintenance of live stock. That the federal Department of Agriculture is keenly alive to the importance of this subject is proven by the experiments being conducted with these fodder plants on a score of Government farms located in different parts of the country.

One of the gravest problems of the day is how to keep the boys and girls on the farm. So far no panacea has been discovered to meet the difficulty, but by adopting better farming methods, by making the home more attractive, by keeping better live stock, by improved conditions of living, and, generally, by doing everything we can to make dwelling on the

farm appealing, the Minister thought that much could be done towards the solution of this difficult problem. At this point a tribute was paid to the work that is being accomplished by the Women's Institutes. Something else required was a better understanding between the city man and the farmer. In this connection, the Minister referred to the difficulties, all unknown to the urban dweller, that the milk producer has to contend with. He referred to the good relationship that had been brought about in certain sections between bankers, other business men, and farmers.

Another subject to which attention had been given was the improvement and extension of markets and transportation. The Minister said that it was realized that the surest way to stabilize the agricultural industry is to furnish the farmer with an absolutely reliable market, or one as nearly approximating that standard as possible, so that he might always be assured of good reasonable prices for his produce. The home market is receiving close attention and much is being done in the cultivation of the European market, and especially that of Great Britain. On the Pacific there is at the present time a market that is worth to the United States and Canada something over a thousand million of dollars. The Minister thought members of Parliament would be surprised to learn that China is one of the chief consumers of Canadian condensed milk, and that Japan also takes many other lines of goods. Recently pure-bred stock had been shipped to Australia, New Zealand and the Hawaiian Islands. There was also a chance for a market on the east and west coast of South America for pure-bred animals. All that could possibly be done was being done to have the British embargo against Canadian cattle removed.

From this point Dr. Tolmie reviewed the work that had been accomplished and was being performed by the different branches of

his department, such as, for instance, the inspection service that was being rendered and the duties of enforcement of the Contagious Disease Act that was being undertaken by the Health of Animals Branch; the work that was being performed by the Seed Branch in seed cultivation and by the Seed Purchasing Commission, which had had a turn over of twelve million dollars, every cent of which had been returned to the Receiver General, in addition to the payment of operating expenses. In this connection the Minister stated that it was not the intention to withdraw the Seed Purchasing Commission from the western provinces until normal conditions are attained. The Fruit Branch had been rendering excellent service by enforcing the Inspection and Sale Act, and by giving practical demonstrations in orchard cultivation, pruning, spraying, grading, *et cetera*. He was afraid that the Experimental Farms system, which was rendering a very valuable service, was hardly appreciated as it might be. Stations are situated in all parts of the country and information is immediately available to the farmer. Especially was this service of value to the settler. In fact it had been estimated that the service rendered was worth four hundred and sixty million dollars a year to the country. Reference was next made to the good service being rendered by the Entomological Branch and tribute paid to the late Dr. C. Gordon Hewitt.

A line of industry that was doing well was the cultivation of tobacco. The crop last year amounted to twenty million pounds, worth about eight million dollars. The industry, however, is only in its early stages. The Minister had great hopes of the extension of this industry, and a representative was already overseas endeavouring to introduce Canadian-grown tobacco into the British market.

In conclusion the Minister stated that it was always the policy of his department to facilitate and encourage

production and better methods of farming by the medium of education, demonstration, and illustration; to encourage a system of mixed farming with live stock as a basis; to increase and encourage better feeding, finishing, and marketing of live stock, and to develop our export trade in agricultural products; to expand our market system in every possible way; to improve and extend the handling

of perishable products; to conserve carefully the health of our live stock; to assist in the development of special lines of production; to encourage co-operative selling; to improve transportation facilities for handling our products; to investigate the possibilities of securing cheaper money for the farmer; to use the best effort to rigidly apply such legislation as is on the statute book for the protection of the agricultural industry.

THE VALUE OF AGRICULTURAL EDUCATION

AT a meeting of the Select Standing Committee of the House of Commons on Agriculture and Colonization called to consider the standardization of the parts of farm machinery the Honourable S. F. Tolmie, Minister of Agriculture, endorsed the proposed policy and expressed hope that the difficulties in the way of its adoption would be overcome. He then addressed the Committee on the subject of agricultural education, emphasizing its value as applied to the live stock industry. He said "Through education we can look for greater improvement in the live stock industry of the Dominion. The scrub bull campaign is an educational campaign and in every province there is a great field for the improvement of live stock. Even in Ontario we find that forty-seven per cent of the bulls in use are scrubs."

As an illustration of the value of education in the care and management of live stock he pointed out that recently a Holstein cow with a record of 32,000 pounds of milk in a year was sold to a man in Pennsylvania for \$15,000. She was a ten-year old with a little heifer calf by her side whose value, based on the selling price of the previous year's calf, was \$1,000. In tracing the history of this cow back to the time she was a calf it was found that she was raised by a Mr. Powell of

Syracuse, N.Y., and was sold for \$150. Had that cow received scrub treatment, had she been permitted to winter on the sunny side of a straw stack, and had she been turned into a sheep pasture in the summer she would have still have been a \$100 animal. However in competent hands she was developed, and she made records, giving over 30,000 pounds of milk for five years in succession. Thus her true value was shown and, because her owner knew his business, that cow is worth practically \$14,000 more than she would have been had she come into the hands of one who did not know how to develop her.

Continuing the Minister pointed out the need of education in the production of beef animals. He referred to his visit to an abattoir in Toronto where last December he saw going over the killing floor a lot of nearly seven hundred head of cattle whose carcasses ranged from 250 to 350 pounds. Not a single carcass in the whole selection was properly finished, which meant an immense loss to the producer as well as poor quality produce for the consumer. In the first place these animals were selling for $5\frac{1}{2}$ cents per pound on foot whereas had they been properly finished and in good shape they would have brought from 8 to 10 cents per pound, at the same time weighing twice as much, which would

have meant a large increase in the profits of the farmer. At present only ten per cent of the cattle that go through our abattoirs are fit for export. A new system recently introduced for encouraging the finishing of steers is a generous prize list for finished lots at live stock fairs. In addition to this the federal Department of Agriculture is encouraging the establishment of a large international live stock show at Toronto which will have an excellent effect in stimulating the development of fat cattle in Canada.

Better business methods for the farm were also advocated. The Minister recommended that we should be more careful in counting the cost of production. The farmer who carries on mixed farming has perhaps one or two lines that are paying, some on which he is losing, and some on which he breaks even. It is in his interest to find out which of these lines are parasites on the thriving departments of the farm. By counting the cost of production the farmer would not only be able to devote more energy toward developing the profitable branches but he would be in a position to eliminate the unprofitable. In this connection he referred to the marketing of farm products and extended hearty congratulations to the farmers whose co-operative enterprises have been so successfully conducted. He considered that this work properly belonged to the activities of the farmers themselves and as an illustration of the value of co-operative practices he related his personal experiences of co-operative creamery operations in British Columbia, where a system was developed that raised dairying from a slipshod undertaking to a methodical, profitable, and growing business.

Community breeding was a point the Minister considered of vital importance at the present time. For

instance one group in a certain area stick together and produce one breed, say Jerseys or Guernseys, so that such a centre might become known as a Jersey or a Guernsey centre where buyers would be able to purchase car-load lots without having to search throughout a whole district containing many breeds. Community breeding is an excellent advertisement for any community and it will receive the hearty encouragement of the Department of Agriculture. The accredited herds system, which has been inaugurated by the Department and is making good headway, will tend to attract buyers from other countries where the same system is in operation. Accredited herds have a guarantee behind them and it is of great advantage to breeders who are specializing in good stock.

Throughout his address Dr. Tolmie urged the necessity of education for farmers in every branch of agriculture. He showed conclusively that success in agriculture is largely due to education; proper methods of cultivation, conservation of soil fertility and moisture, together with timely attention to seasonal requirements, go far to insuring abundant crops. Along with this a practical knowledge and study of market conditions throughout the world, and a good understanding of local demands, enable us to dispose of our products at the right time and at adequate prices. A knowledge of the requirements of the human animal is essential if we are to get most out of life. This is especially true in the rural districts, where the knowledge must embrace the mental, physical, and spiritual needs of both ourselves and our neighbours. The home life, community life, and the life of the nation are largely dependent upon our mental attitude toward our work and our outlook on life in general.

COLLECTION OF 1920 AGRICULTURAL STATISTICS

IN THE AGRICULTURAL GAZETTE for May was described in some detail the arrangements for the collection of this year's annual agricultural returns, as undertaken by the Dominion Bureau of Statistics and the provincial Departments of Agriculture. It is desirable again to draw attention to the importance of these returns and to impress upon all who are in official relations with farmers that they should do their utmost to secure the return of the simple information required. The cardboard schedule, copies of which are being distributed during the present month, calls for (a) the areas sown this year in the principal field crops, and (b) the numbers of each description of farm live stock (classified by ages in the case of horses and cattle) on the farm at the date of collection in mid-June. The cards are being distributed to farmers through the agency of the rural school teachers and school children who in the two or three years that the system has been in operation have shown praiseworthy intelligence and zeal. The co-operation of the schools indeed furnishes the occasion for a valuable object lesson of a practical character, stimulates the patriotism of scholars,

and helps to train them to understand the importance of the statistics required, and to take their share in furnishing them when they themselves shall have succeeded to the practical business of farming. In these days of diminished food supplies, the demand for accurate statistics of production is increasingly insistent, and it is of the highest importance that Canadian food producers and distributors should know as accurately as possible where the country stands in relation to world supplies. This knowledge can only be gained by securing statistics that can be trusted. It is, therefore, confidently expected that the farmers of Canada, who have, during the strenuous years of the great war risen so nobly to the demands made upon them for increased production, will not fail to perform the simple duty of filling up the annual schedule now in course of distribution. Any farmer who does not receive the cardboard schedule by the middle of June should apply for one either to the school teacher in his school district, to the agricultural department of his province, or to the Dominion Bureau of Statistics at Ottawa. In British Columbia the cards are being mailed direct to each farmer.

THE PROTECTION OF BIRDS

BY HOYES LLOYD, ORNITHOLOGIST, DOMINION PARKS BRANCH, OTTAWA

BIRD protection is of recent development, seventy-five years practically covering its history. The naturalists of the close of the eighteenth century, and the beginning of the nineteenth, studied and named many of the birds of the world. With this nomenclatural work, and following it, interest in the economic value of birds began to develop and, finally, the ornithologists, farmers, and foresters of Europe began a movement which terminated

in the first International Convention for the Protection of Birds, The Treaty of Paris, signed March 19, 1902.

In America the recognition of the value of birds to man increased as the knowledge of birds increased. It was found by the scientists that the birds constituted one of the most important natural checks on insect pests which harassed the farmer and the fruit grower. Systematic studies of birds were made to determine the

food of each and on these findings the habits of the birds were classified as beneficial or otherwise. The results of these studies are available to all and it may be considered that the friends and foes among our birds have been properly differentiated by this work.

When cultivating the garden one must distinguish between the weeds and vegetables, and it is just as essential that birds which protect the crop be distinguished from those which damage it. The law must recognize the difference between the two groups of birds—beneficial and destructive—and the people of Canada must acquaint themselves with their friends and enemies in the bird world.

The greatest measure ever undertaken on this continent for the protection of birds was put in force by the Migratory Birds Convention Act, 1917, in Canada, and the Migratory Bird Treaty, 1918, in the United States.* Previous to the ratification of this treaty, birds needed as insect destroyers in the northern states and Canada were being killed for sport in the eastern states, whereas the present spring restrictions and the poorer shooting possibilities in the fall are now assisting the treaty and its enforcement.

We need our game birds for other reasons. They are needed as an incentive to our own people to visit and live out of doors. They attract tourists from other countries and thus, if given suitable protection, they will provide a perpetual source of revenue. It is our duty, however, to make certain that we are using the interest, which is the natural increase, and not the capital, which is the spring flock migrating north, as game.

The non-game birds are not of importance from an economical standpoint. These birds, however, add to the attractiveness of our natural Canadian wilds.

The insectivorous birds protected

by the Treaty amply repay all efforts made in their interest. Without cost to us they labour unceasingly to destroy the pests of field, garden, and orchard. Although one of nature's most important checks to prevent the devouring of our forests, crops, and gardens by insects they are seldom given the credit they deserve. The bird population of gardens and orchards near farm houses has generally been found to exceed that of any other locality. An effort should be made to protect these birds that find the neighbourhood of man so suitable to them, and in some cases bird boxes can be provided to meet the needs of some species. Every garden could thus be made into a bird sanctuary, and the enjoyment to be gained from it as well as the advantages from an economic point of view would be well worth the effort.

The Dominion Parks Branch of the Department of the Interior which administers the Migratory Birds Convention Act in Canada has done much for the protection of the beneficial and non-game birds. They have operated through pamphlets, circular letters, and the press. They maintain a full time staff of migratory bird wardens who post notices concerning the law, and address the school children throughout their districts. A motion picture film, prepared to acquaint the public with the work of bird protection, is now being shown throughout Canada; later, through the auspices of the Department of Trade and Commerce, it will be shown around the world. The bird sanctuary question is being dealt with. There are three sanctuaries now in the Gulf of St Lawrence, and Point Pelee in Ontario. Heavy penalties are provided by the Act for those who violate the federal bird law. The Government is taking full action to enforce the bird protection law and every one who is interested in preserving our resources in wild bird life can be of assistance.

* *The Agricultural Gazette of Canada*, December, 1916, and June, 1918, gives an account of the international convention, and the regulations regarding migratory birds.

PART I

Dominion Department of Agriculture

EXPERIMENTAL FARMS

DIVISION OF ANIMAL HUSBANDRY

NEW LIVE STOCK AT CENTRAL FARM

DURING recent months substantial increases have been made to the dairy herds by local purchases and through importations from Scotland.

AYRSHIRES

The Ayrshire herd has been increased by ten head secured at different points in Ontario and thirteen head imported direct from Scotland. The locally purchased group is made up from one lot of two very choice Ayrshire cows from the herd of T. Fairburn, Billings Bridge, Ont., and three good animals, all with R.O.P. records, secured from Collier Brothers, Beachville, Ont., together with five head comprising two mature cows, one two-year old heifer and two heifer calves from the dispersion sale of Walter Smith, Athens, Ont.

The imported group of Ayrshires, consisting of thirteen head, includes one yearling bull giving excellent promise, eight cows, two three-year olds, and two yearlings. These animals, purchased by Robert Cunningham through Thomas Barr, Hobsland, Moncton, Scotland, are all from leading herds in that neighbourhood and have been carefully selected. The animals are well bred and will be a valuable addition to the creditable herd which is already established at the farm.

HOLSTEINS

The Holstein herd has been augmented from time to time by local purchases of outstanding individuals and lots of animals. Thirteen head were secured from breeders in western Ontario in February. Ten of these were mature cows, and three were two-year old heifers. Later on about the end of March another cow was secured from G. A. Brethern of Norwood, Ont. At the national sale in Toronto in April a lot of four uniform cows all of good breeding and backed with good records was secured, making a total addition of eighteen head of substantial dairy animals to the Holstein herd.

BORDER LEICESTER EWES IMPORTED

A flock of twelve promising Border Leicester ewes was imported from Scotland along with the Ayrshire importation. These ewes, which have been added to the Border Leicester flock already established at the farm, were secured from the breeders around Auchenbrain, Kircudbright, Hobsland, and Aikenhead, Scotland.

This year there are possibilities of increased pasture land for the sheep belonging to the Central Experimental Farm. This will permit of further breeding and investigation work in connection with sheep raising at the Central Farm.

POULTRY DIVISION

MAMMOTH INCUBATOR UNDER TEST

BY F. C. ELFORD, DOMINION POULTRY HUSBANDMAN

THE ten thousand egg mammoth incubator installed by the Poultry Division at the Central Experimental Farm, Ottawa, in 1919, did not give very satisfactory results during the first part of last season but improved later in the year. It has again been tested and gave fair results during the early part of the present season, or during the time that the machine was not loaded to full capacity. However, when loaded to capacity, or nearly so, the later hatches have been poor.

Upon investigating the cause of last year's poor hatches it was decided that the chief cause of trouble was the lack of good ventilation. When this trouble was remedied, and sufficient ventilation given, the hatches were improved. This year the same conditions were provided, and the results were quite satisfactory while the machine was not carrying its full load, but as soon as it was filled to near its capacity the hatches were unsatisfactory.

It is intended to give this machine a further test if the new incubator cellar is built this season.

POULTRY HUSBANDMAN APPOINTED

MR. A. G. Taylor, B.S.A., who has been assistant in the poultry division at Macdonald College and in charge of poultry extension work for the province of Quebec, has recently accepted an appointment as poultry husbandman under the Dominion Poultry Husbandman at the Central Experimental Farm.

On graduation from Macdonald College in 1915, Mr. Taylor entered upon his work in Quebec province, and he has been continuously engaged in poultry investigations and organization work since that time. In co-operation with the Professor of poultry husbandry at Macdonald

College he carried on breeding investigations at the college and at the same time organized poultry demonstration stations in the English-speaking districts of Quebec. These stations supplied eggs of bred-to-lay strains to be used in connection with children's clubs and school fair work. In this way Mr. Taylor was able to select the best individuals at the college, and by mass breeding at the various stations provided large numbers of eggs of the most valuable strain for general distribution throughout Quebec.

From now on the laying contest conducted by the Experimental Farm will be under Mr. Taylor's charge.

IRRIGATION INVESTIGATION UNDERTAKEN BY THE SUMMERLAND STATION

BY R. H. HELMER, SUPERINTENDENT

IRRIGATION is becoming more necessary in British Columbia each year and is spreading to such districts as Vancouver and Vancouver Island, and districts that a few years ago advertised the fact that irrigation was not necessary are

now finding the need of it and are installing systems.

The problems, therefore, that confront us are becoming more complex each year. Our work on this Station comprises a great variety of experiments on amounts of water

to use on various crops on various soils; the effect of soil moisture on the hardiness of tree growth to resist injury. We hope to establish the most economical amount of water to apply to various types of soil for maximum crops. These range from 6 acre inches per annum to 48 acre inches per annum, also the proper amount to apply to each irrigation; the proper time to apply to fill grain; the effect of time of application on the setting of alfalfa seed, mangel, carrot, cabbage, lettuce and other seeds. The length of run for the most economical distribution of water in the soil is an important factor in our work on this Station, as many of our soils may be easily ruined by too long a run, the end near the outlet being too wet and the end too dry. How best to maintain soil fertility under various rotations with such crops as cereals, corn, roots, potatoes, also various soiling crops, and to find out suitable alfalfa, clover and grass mixtures for hay and pasture is an important part of the work. The work in handling vegetable crops under irrigation and finding the amount of water best suited to each is under investigation, as are also the varieties best suited to this work. Probably our most important work is the effect of various amounts of water applied

to orchards under different cultural methods, as regards tree growth, fruiting, time of ripening the wood, and hardiness to resist winter injury, also the advantage of deep irrigation in orchards. Fall and winter irrigation is a phase of our work that deserves more investigation than it is getting, and we hope in the near future to do more work along this line, as in the fall and early winter we can count on an abundant water supply, and our land is very often too dry in the winter.

The land in the Dry Belt of British Columbia is rolling or fair to steep slopes and the furrow system is best adapted to our conditions. The water is distributed from ditches or flumes. Our measuring devices are British Columbia Miners' Inch Boxes and this type of box is undoubtedly the most accurate measuring device for small volumes of water. All our work goes to show that water must be available in large quantities during the latter part of June and middle of August, or just at the time when our creeks are at their lowest or completely dry. Storage water is the big problem confronting most irrigation districts and as more land comes under irrigation more storage must be provided.

DAIRY AND COLD STORAGE BRANCH

GRAPE STORAGE TESTS AT GRIMSBY

BY C. N. BONHAM, SUPERINTENDENT

COMMERCIAL grape storage tests were started at the Grimsby Pre-cooling and Experimental Fruit Storage warehouse during the grape picking season of 1919. Tests were made in order to determine (a) which varieties are most suitable for storage for the Christmas market; (b) with what degree of success they could be stored; and (c) what prices might be realized

for them in competition with the imported product at the Christmas season.

The tests were not carried out on a large scale, only sufficient grapes being stored to make a fair commercial test. The five varieties included were Niagara, Agawam, Lindley, Vergennes, and Black Rogers. They were delivered to the plant in six-quart climax baskets by local

growers and were stored in a variety of packages in order that the test might be made of different types of packages and varieties at the same time.

PACKAGES

The first package consisted of an ordinary six-quart climax basket packed as for immediate shipment. Removal of all crushed or spoiled grapes was the only special preparation. These grapes, as well as those in other packages, were held in storage at a temperature of 32° F. On withdrawal for shipment on December 19th the loss in this package was found to be very slight, most of it being in the nature of stem mold. The grapes retained their appearance satisfactorily and were in good condition for sale. However when grapes in these baskets are piled in storage, as is necessary with commercial lots of any size, the stem mold is likely to be quite considerable, therefore the climax basket cannot be recommended as thoroughly satisfactory for long time storage.

The second package under test was the keg similar to that in which foreign grapes are imported. The preparation of the fruit was the same as in the case of the six-quart climax basket. The bunches were put in one layer at a time, and covered with granulated cork, and the keg shaken from time to time so that the cork would work in between the berries. The condition of the fruit in this package was practically the same on removal as when put in storage. Very little shrinkage in weight occurred, and the loss through mold and decay was almost *nil*. For small lots for private use this package is preferable to any other, but cannot be recommended as an economical package for large commercial lots owing to the cost of packing and unpacking.

The third package tried was the storage "flats," which proved most

satisfactory from an economical standpoint. The "flats" consisted of shallow trays 18 in. by 24 in. and by 4 in. deep. Spaces were provided between the bottom slats and the side pieces were spaced 1 in. below the top of the end piece. This allowed a maximum of ventilation to reach the fruit and reduced mold waste to a minimum. Another advantage is that the "flats" can be piled ceiling high without any of the weight coming on the fruit in the lower tiers. This is an important consideration in the cost of storage since all packages cannot be piled in this manner. Each "flat" holds about three six-quart baskets and the handling can be conveniently and quickly done. This basket is strongly recommended for long time commercial grape storage.

VARIETIES

Of the five varieties tested the Niagara will be eliminated in results. Practically all the berries fell off the stems as soon as they were handled, and this alone makes them worthless for commercial purposes.

The Black Rogers gave perhaps slightly better results than any of the other varieties, there being practically no noticeable shrinkage or withering of the fruit. Spoiled berries were almost *nil* and a total loss in weight was only 8 per cent. Since these grapes were not sold by weight this loss had very little influence and from a commercial standpoint was negligible.

Very little difference was found in the keeping qualities of the three red berries. The total waste from mold and other spoiled berries was not more than 1 to 1½ per cent while the shrinkage from evaporation was practically the same as that of the Red Rogers. The Agawam was slightly more susceptible to stem mold than any of the others while the Lindleys were almost immune from this fault. Taking all varieties

into consideration the loss from this cause was so small that it might be overlooked as a cause of serious waste except in a very late season when the grapes have to be picked before they are properly matured.

RETURNS

The grapes were retailed by two leading fruit stores in Hamilton at 50c. per Pony basket. Fifteen cents per basket was retained as commission and 35c. was returned to the growers. The two pound Pony basket is highly recommended in this connection as, besides its attractiveness, it holds a convenient amount of fruit for a trade of this kind. After several days in the warm dry store some withering of the fruit was noticeable. However this was slight and did not materially detract from the appearance of the fruit. Figur-

ing the returns according to the cost of fruit, packages, storage, and labour the total cost per six-quart basket was \$05.07, and the total receipts per six quart basket stored was \$0.7627. the net increase thus being over 25½c. per six-quart basket.

From the results obtained it would seem that if the fruit is properly stored and packed for sale a market may be developed which will enable the Canadian grower to dispose of a considerable quantity of grapes on the Christmas market at a satisfactory margin over the prices being received at picking time. However it cannot be recommended that growers attempt the storage of grapes for Christmas sale on anything but a conservative basis at first with a view to increasing the trade as the consuming public becomes educated to the use of these in place of the expensive imported varieties.

ENTOMOLOGICAL BRANCH

NEW APPOINTMENTS

THE following permanent appointments have recently been made.

H. G. Crawford, M.S. (R.S.), Entomologist, Division of Field Crop and Garden Insects: Mr. Crawford graduated from the Ontario Agricultural College in 1915. He then spent two years at the University of Illinois. In 1916 he secured the degree of M.S.

During the summer of 1915 he assisted the Provincial Entomologist of Ontario and in 1916 and 1917 was employed in the Dominion Entomological Laboratory at Strathroy. During the last two years he has been on the staff of the Department of Entomology at the Ontario Agricultural College, lecturing chiefly to the third and fourth year students.

Mr. Crawford's work will have special reference to soil infesting insects and means of controlling

them. He has given much thought to such investigations, his post graduate work being specially directed along such lines.

Eric Hearle, B.S.A. (R.S.), Assistant Entomologist.

Mr. Hearle graduated from the Ontario Agricultural College in 1918. For two summers he was engaged in field work by the Provincial Department of Entomology. During the college sessions of 1917 and 1918 he was resident master and lecturer in English literature and composition. In 1917 he also lectured in systematic and economic entomology and zoology. In the summer of 1919, during the tenure of a studentship from the Council for Scientific and Industrial Research, he undertook an investigation and study of the mosquito pest of the Fraser Valley, B.C.

Mr. Hearle's headquarters are at Mission, B.C. He will continue investigations on the biology and distribution of Canadian mosquitoes and other blood-sucking insects.

Vernon B. Durling, B.S.A. (R.S.), Junior Entomologist.

Mr. Durling graduated from MacDonald College in 1914. He has had

several seasons' experience in entomological field work and in demonstration work among farmers. He has also a practical knowledge of the control of apple and potato pests and is interested in the chemistry of insecticides. His headquarters will be at Annapolis, N.S.

DESTRUCTIVE INSECT AND PEST ACT AMENDMENT

BY an Order-in-Council passed on April 14th, 1920, the following paragraph is added to section 7 of the regulations under the Destructive Insect and Pest Act. This paragraph is to be known as subsection 1.

"(1) Alfalfa (lucerne) hay, whether for feeding, packing, or other purposes, originating in the States of Idaho, Utah, and also in the counties of Unitah, Sweetwater, and Lincoln in the State of Wyoming, and the counties of Dennison and Gunnison in the state of Colorado, four of the United States

of America. The prohibition shall not extend to shipments of alfalfa (lucerne) hay transported through the districts mentioned on a through bill of lading."

To section 18, which contains a list of the destructive insects, pests, and diseases, is added the alfalfa weevil (*Phytonomus posticus* Gyll.). This weevil is a serious pest to alfalfa in the sections of the United States mentioned in the paragraph above. The amendment was passed in order to prevent its introduction into Canada with shipments of alfalfa hay.

HEALTH OF ANIMALS BRANCH

DIPPING CATTLE FOR MANGE IN THE PRAIRIE PROVINCES

FOR a number of years the presence of mange amongst the herds of southern Alberta and south-western Saskatchewan has necessitated the quarantining of that area by the Health of Animals Branch. The quarantine regulations have, of course, resulted in inconvenience and some loss of profit to cattle owners, but the live stock men have never given such co-operation and help to the officers of the Branch as are absolutely necessary if the disease is to be wiped out. Mainly owing to this reason it has not, before this year, been found possible to get every single head of cattle in the quarantined area dipped twice, and at the same times. As the dipping solution only destroys the parasites and has no effect on the eggs, the

animals not given the second dipping still retain on their skins eggs which hatch out and perpetuate the disease.

During the past few years the United States authorities have found that mangy Canadian cattle were reaching their markets, consequently they took immediate action to restrict the importation of Canadian cattle and eventually they prohibited the importation of all cattle from mange infected areas, unless for immediate slaughter. This action resulted in hardship to many Canadian stock men within the mange area who owned individual herds of cattle which were entirely free from the disease.

In view of the American attitude and in consideration of the future importance of the eradication of this disease the Department of Agricul-

ture took advantage of the situation and called meetings of western stock men to discuss the advisability of enforcing a compulsory dipping order during the present summer. The meetings were well attended and the question was very thoroughly discussed. Eventually the ranchers realized their position in the matter and unanimously passed a resolution urging the federal Government to enforce a compulsory dipping order which would include all cattle within the infected areas regardless of their being diseased or not.

Dr. J. H. Grisdale and Dr. George Hilton were present at these meetings and explained the situation clearly and definitely. They advised the stock men that if they co-operated with the Department, and assisted in making the compulsory dipping order effective, the Department would remove the blanket quarantine now in force and afterwards deal with individual cases, enforcing separate quarantine as occasion demanded.

It was, therefore, decided that all cattle within the infected areas should be dipped twice. The first dipping should commence on June 4, and the second dipping not less than ten nor more than fifteen days thereafter. The Department is making a special effort to provide for every emergency in order that the dipping can be properly performed. The co-operation of the Royal Canadian Mounted Police has been obtained to deal with any opposition that may arise.

The following are the regulations governing the special cattle mange order for Alberta and Saskatchewan:-

REGULATIONS.

Cattle for Shipment outside the area for purposes other than immediate slaughter.

1. The movement of cattle for any purpose out of the area is prohibited during the period from June 24 unless accompanied by a certificate signed by a veterinary inspector of the Department of Agriculture, stating that they have been twice dipped under official supervision within the above period.

2. Except during the period from June 24 to July 5, 1920, cattle intended for grazing, feeding, breeding purposes, or milk production, or any purpose other than immediate slaughter may be removed or allowed to move out of the above described tracts if they are accompanied by the certificate of a regular salaried veterinary inspector of the Department of Agriculture stating that they are free from disease, and that they have been, within a period of thirty days immediately preceding the date of shipment, treated under the supervision of a regular salaried veterinary inspector and in a manner satisfactory to him, and that they have not, since being so treated, been exposed either directly or indirectly to the contagion of mange.

No railway company shall accept any such cattle for shipment, unless accompanied by the above described certificate.

Cattle for immediate slaughter outside the area or for export to Europe.

3. Except during the period June 24 to July 5, 1920, cattle intended for immediate slaughter or for export to Europe may be removed or allowed to move out of the above described tracts under the following conditions:

(a) Cattle, other than those consigned to Winnipeg or to points in Canada east of Winnipeg, shall be removed or allowed to move out of the above described tracts, either by rail or otherwise, only when accompanied by the certificate of a veterinary inspector of the Department of Agriculture, stating that they have been examined by him and have been found free from infection of mange and other contagious disease.

(b) Cattle, consigned to Winnipeg or to points in Canada east of Winnipeg, whether originating within the above described tracts or not, shall be inspected at Winnipeg, and no railway company shall release such cattle at Winnipeg, or load such cattle for re-shipment therefrom, until they have been submitted by daylight to a veterinary inspector of the Department of Agriculture and certified by him to be free from mange and other contagious disease.

(c) Cattle for export must be accompanied by a certificate signed by a veterinary inspector stating that they are free from disease and that they have been, within a period of thirty days immediately preceding the date of shipment, twice dipped in a manner satisfactory to him, and that they have not, since being so treated, been exposed either directly or indirectly to the contagion of mange.

(d) Cattle found on inspection to be affected with mange or other contagious or infectious disease shall, except as hereinafter provided, be dealt with as may be ordered by the veterinary inspector.

Infected cattle for immediate slaughter within the area.

4. Cattle showing evidence of mange, originating in a place which has been declared to be an infected place, may be removed therefrom for shipment by rail for slaughter at a given destination within the quarantined area only, in the judgment of a regular salaried veterinary inspector, who, if he sees fit, may issue a license for such removal, as provided in section 23 of the Animal Contagious Diseases Act.

5. In the event of any cattle affected with mange, but which have not originated in a place declared to be an infected place, being presented for shipment by rail such cattle, together with any others with which they have been in contact, shall be immediately detained and isolated, or may, if the veterinary inspector sees fit, be shipped, under the conditions hereinafter set forth, to a slaughter house within the area properly equipped as hereinafter provided, for immediate slaughter only. The veterinary inspector shall immediately report the matter to the nearest regular salaried veterinary inspector of the Department, who shall thereupon take such further action as may appear to him to be necessary.

6. The loading of the above classes of cattle must be personally supervised by an inspector, who must see that the cars conveying them are duly billed to a slaughter house as above provided and that the said cars bear the placard required by section 7 of this order.

(a) The inspector at the point of shipment shall also notify by telegraph the inspector at the point of destination of the fact that the cattle are being forwarded.

(b) Unless loaded through special yards and chutes reserved exclusively for such shipments, all yards and chutes, weigh scales, or other appliances with which they have been in contact shall be declared infected places and shall not again be used until cleansed and disinfected to the satisfaction of an inspector; such cattle shall not be allowed to come in contact with other animals; shall be consigned direct only to such slaughter houses within the hereinbefore described tracts as are provided with private yards and chutes; shall not be unloaded at any point en route, and shall under no pretext whatever be removed alive from the slaughter house or the yards and the premises immediately connected therewith.

General provisions regarding shipment.

7. All waybills and bills of lading accompanying shipments of cattle originating within the said tracts, other than those shipped under the provisions of sections 1,

2, and paragraph (c) of section 3, of this order shall have plainly written or stamped across the face thereof a notification that the cars conveying such shipments are to be cleansed and disinfected after being unloaded, and before being again used.

8. All cars conveying such cattle must bear a placard having clearly printed thereon, in letters not less than six inches long the words "Cattle for immediate slaughter only." Such cards shall in no case be removed unless and until the cars have been cleansed and disinfected after being unloaded at final destination.

9. At points where cattle originating in the said tracts, other than those provided for in sections 1, 2, and paragraph (c) of section 3, of this order, are unloaded they shall be placed in special yards, and such yards shall be used for no other purpose and shall be cleansed and disinfected when so ordered by an inspector.

10. Cars conveying such cattle shall be cleansed and disinfected to the satisfaction of an inspector after being unloaded and before being again used.

11. Cattle shipped for immediate slaughter shall not be sold or otherwise disposed of for any other purpose.

The transit of cattle through the area.

12. The transit of cattle through the said tracts is permitted, subject to the following regulations:—

(a) Cattle passing by rail through the said tracts from one part of Canada to another, shall at points where unloading is necessary, be placed in yards specially reserved for this purpose, and shall not be permitted to come either directly or indirectly in contact with cattle which have originated within the said tracts, other than those provided for in sections 1, 2, and paragraph (c) of section 3 of this order.

(b) Cattle imported from the United States into the said tracts destined for points in Canada outside thereof may under compliance with the Quarantine Regulations, and with the provisions of the next preceding paragraph hereof, be permitted to pass without unnecessary delay through the said tracts direct to their destination without further restrictions.

13. Any infraction of these provisions shall be deemed an infraction of the Animal Contagious Diseases Act and dealt with accordingly.

14. The Minister is hereby empowered to make such alterations in the boundaries of the quarantined area defined by this order as may from time to time seem to him necessary or advisable.

ASSISTANCE TO THE FOX INDUSTRY

IN view of the importance of the fur trade industry and in order to assist individuals who are interested in the raising of black foxes in Prince Edward Island, the Health of Animals Branch is establishing a laboratory in the vicinity of Charlottetown, P.E.I. Dr. J. A. Allen, one of the pathologists connected with this branch, is in charge of this laboratory and is conducting certain experiments relating to the food of foxes and the treatment of digestive disorders to which they are subject. Investigations are also being made with reference to certain contagious diseases liable to cause serious losses among young vixens. Dr. Allen is devoting his whole time to this

work and is being constantly consulted by fox breeders who are anxious to secure fullest information pertaining to the feeding and management of their valuable animals.

A few limited experiments are being started also at the research station at Hull, P.Q. These experiments also have to do with the feeding of foxes. Fox breeders have experienced a great deal of difficulty in providing a proper food for the animals in captivity. The Department is therefore engaging the services of Mr. M. N. Smith, a nutrition expert from Toronto University, who will conduct experiments with a view to ascertaining what is and what is not a proper and satisfactory diet for black foxes in captivity.

LIVE STOCK BRANCH

NEW INSTRUCTORS, PROMOTERS, AND AGENTS APPOINTED

A NUMBER of men have recently taken up their work in the various divisions of the Live Stock Branch as shown in the following paragraphs:—

STOCK YARD AGENT AT PRINCE
ALBERT

D. A. McKenzie, B.S.A., has been appointed Stock Yard Agent at Prince Albert, Sask. This is carrying out the system inaugurated under the Live Stock and Live Stock Products Act to give supervision on all stock yards for the purpose of rendering assistance to all parties interested in the sale of cattle. His office is on the stock yards and his services are at the disposal of any parties doing business on the yards. Mr. McKenzie is a graduate of the Ontario Agricultural College, Guelph. He has had wide farming experience both in Ontario and in the

Prairie Provinces and it is anticipated that he will be able to assist very materially in the development of the live stock industry in the northern part of Saskatchewan.

BRITISH COLUMBIA SHEEP PROMOTER

Mr. Arthur Morton, who has been connected with the Sheep Division of the Live Stock Branch for a number of years, has received a promotion, and recently has taken charge of the sheep work in British Columbia. Included among his duties will be the co-operative marketing of wool and the general building up of the sheep industry. Also he will spend some time giving assistance in the development of the goat industry which is occupying the attention of many breeders in that province. Mr. Morton has had excellent experience in sheep raising that fits him for this particular work.

EGG INSPECTOR FOR ALBERTA

R. H. Innismore, who has been engaged in work with the Live Stock Branch at Ottawa, is now representing the Poultry Division at Edmonton, and has taken charge of the export and interprovincial shipments of eggs. He is introducing the new legislation in egg marketing whereby all buyers are obliged to buy and sell on a strictly quality basis. The new legislation will raise the standard of eggs for export and it is expected will increase the consumption of eggs within the country.

ACTIVITIES IN QUEBEC

The Live Stock Branch in conjunction with the provincial Department of Agriculture has planned to carry on work to assist the farmers in Quebec in the marketing of their live stock. The Branch has secured an office in the Customs Building, Youville Square, Montreal. Mr. Raymond, District Poultry Promoter, Mr. Rodrigue, District Sheep Promoter, and a live stock specialist to be appointed, will have their headquarters in this building. These men will keep closely in touch with the trade in the live stock yards in Montreal or other cities and will be prepared to give every assistance to purchasers in the marketing of their live stock, eggs, and poultry.

QUEBEC POULTRY PROMOTER

Abel Raymond, B.S.A., demonstrator in Megantic County, has been appointed district poultry promoter for Quebec, and has already commenced his duties under the direction of the Live Stock Branch of the federal Department of Agriculture. After a study of the systems of organization and methods of quality payment followed by co-operative marketing organizations in Ontario, and visiting Prince Edward Island to learn particulars of the co-operative marketing of eggs and poultry in that province, Mr. Ray-

mond will confer with the provincial officers, demonstrators, and others as to the best ways and means of developing the poultry industry in the province of Quebec. A survey of the province will be made to ascertain the number of poultry producing districts and those which give promise of ready development.

With the training in agricultural science, which Mr. Raymond received at the Oka Agricultural Institute and at the Ontario Agricultural College, Guelph, and his work in Megantic County in connection with the promotion of co-operative shipping associations, and with his wide knowledge of conditions in the province of Quebec, and his personal acquaintance with the demonstrators in that province it is felt that Mr. Raymond's selection is a particularly fortunate one in the interests of agricultural development as a whole and eggs and poultry in particular.

DEVELOPMENT IN THE MARITIME PROVINCES

One year ago a campaign was inaugurated in New Brunswick for the better fitting of lambs for market and this was followed up by co-operative shipments to Montreal. This movement proved so satisfactory that a large number of requests were immediately registered and a much wider territory was touched than was originally intended last year. This year, at the request of the people, a man is already at work in Prince Edward Island. Three extra men have been placed under Mr. J. K. King to work for the Moncton office in New Brunswick, and arrangements are being made to immediately place a permanent official in Nova Scotia to carry on similar work. The underlying idea is to place live stock on the markets in the best condition and in the best possible manner, in order to bring the most satisfactory prices available.

PART II

Provincial Government Departments

WEED CONTROL MEASURES

In the February number of *The Agricultural Gazette* there appeared a graphic account of the work of the Manitoba Weeds Commission. The following articles show what work is being done for the control of noxious weeds in several of the other provinces.

NOVA SCOTIA

BY M. CUMMING, B.A., B.S.A., LL.D., SECRETARY FOR AGRICULTURE.

IN the province of Nova Scotia the Department of Agriculture does not conduct any definite general policy for the control of weeds. The municipal councils have the power to make appropriations for dealing with any serious local infestations of weeds. This power has only been exercised occasionally and then only in respect to one quite troublesome weed which infests the

make inroads into the non-infested areas.

Apart from municipal control the Department of Agriculture has in one or two cases where it was thought that aggressive measures would permanently eradicate this ragwort, made appropriations for the purpose of its destruction. Fortunately the conditions prevailing in Nova Scotia are such that good farming will, in



BALL MUSTARD

eastern part of Nova Scotia. This weed is *Senecio Jacoboea* commonly called ragwort. This plant has been proven to be the cause of what is known as the Pictou County Cattle Disease (serosis of the liver). In several of the counties adjoining the area of land infested, appropriations have from time to time been made for destroying this weed at points where it was just commencing to



PURPLE COCKLE

the main, control any injurious weeds that grow in the country.

The general intervention of wood lands and hills prevent the rapid spread of such weeds as those of the thistle family, etc., which in more level open country would spread rapidly. This condition relieves the farmers of the province from serious weed infestations such as the farmers are subjected to in the level prairie areas.

NEW BRUNSWICK

BY E. P. BRADT, B.S.A., SECRETARY FOR AGRICULTURE

NOXIOUS weeds annually cause an immense loss to the agriculture of the various provinces; New Brunswick is no exception to this. The Ox-eye Daisy is particularly prevalent in our meadows. The Perennial Sow Thistle is also fast gaining a foothold and the Common Wild Mustard is a nuisance in some districts.

As yet there is no legislation in this province dealing with the control

of noxious weeds, but as this is a very important issue it is a matter that will doubtless be taken up in the near future.

Individually the farmers are making an effort to keep their farms clean and free from weeds and with the aid of rigidly enforced legislation more satisfactory progress in the control of noxious weeds might be expected.

QUEBEC

BY L. P. ROY, B.S.A., AGRONOMIST

TO make a correct estimate of the losses and damages caused every year by useless plants and noxious weeds growing with our farm crops, would be an impossibility. If the injuries of these pests and the damages which they cause to our crops could be expressed in

seeds through commercial seeds, we have, in Quebec, a provincial law authorizing anyone interested to compel the owners of vacant lots to cut, between the first of January and the first of November, noxious weeds growing on the said lots. Under the same law, anyone may compel his



WILD MUSTARD



COMMON SOW THISTLE

figures, then perhaps our public bodies and farmers, astounded at the immensity of the losses, would display more strenuous efforts to prevent their propagation.

In addition to the Dominion laws preventing the dissemination of weed

neighbour to pull out the mustards and daisies, as soon as these weeds have blossomed out, even in a sown field.

There is no doubt that this law, strictly applied would largely reduce the risk of propagation of the most

noxious of our weeds; however, the experience of the past has shown that it is necessary to adopt more stringent and more efficient measures of control.

With the promulgation of the Dominion Seed Act, and the general spread of education among the farming class, it is comparatively easier to-day to prevent weeds from invading our farm crops, but, unfortunately, there are other causes favouring the propagation of these enemies of our crops, which should be removed before we hope to make any real progress.

A summary study of the question shows clearly that weeds are found chiefly along our public roads, on vacant lots, along fences and ditches,

and on neglected farms. There they grow freely, and natural agents help in carrying their seeds on to cultivated fields; no subsequent means of control can, therefore, be really efficient.

It is necessary, therefore, to have not only a staff of men to apply the existing laws, but action should also be taken to urge the municipalities, owners of lots, and farmers, to destroy, at flowering time, all noxious weeds thus growing at large. To this end, the Quebec Department of Agriculture asks its agricultural representatives, who are located in many parts of the province, to urge the municipalities to take up the fight against weeds.

ONTARIO

BY PROF. J. E. HOWITT, M.S. AGR., ONTARIO AGRICULTURAL COLLEGE, GUELPH

IN Ontario two methods have been tried for the control of noxious weeds, namely legislation and education. Under legislation there is "The Act to prevent the spread of Noxious Weeds." The main clauses of this Act are as follows:—

"Every occupant of land, or if the land is unoccupied, the owner, shall cut down or destroy all Canada Thistle, Ox-eye Daisy, Wild Oats, Ragweed, and Burdock growing thereon and all other noxious weeds growing thereon to which this Act may be extended by by-law as hereinafter provided, so often in every year as is sufficient to prevent the ripening of their seed, if such cutting or destruction does not involve the destruction of growing grain.

"The council of any local municipality may, and upon a petition of fifty or more ratepayers shall, appoint at least one inspector to enforce the provisions of this Act in the municipality, and fix the amount of remuneration, fees, or charges he is to receive for the performance of his duties; and if a vacancy occurs in

the office the council shall fill the same forthwith.

"Any person who knowingly sells or offers to sell any grass, clover or other seed, or any seed grain among which there is the seed of Canada Thistles, Ox-eye Daisy, Wild Oats, Ragweed, Burdock, or Wild Mustard shall for every such offence incur a penalty of not less than \$5 and not more than \$20.

"Any person who sows any wheat or other grain knowing it to be infested by the disease known as smut without first using some proper and available remedy to destroy the germs of such disease, shall incur a penalty of not less than \$5 and not more than \$20."

Some few years ago an investigation was made into the effectiveness of this Act and it was found that out of the six hundred townships of Ontario, only ninety-two were making any effort to enforce the Act. In forty-nine only had inspectors been appointed. In regard to the work of inspectors, seventeen townships reported the work of the inspectors as satisfactory; fourteen reported

that the work was partially satisfactory. Out of the six hundred townships of the province, fifteen only reported that this Act was successfully enforced; seventy-two that it was partially enforced; and the remainder reported that it was practically a dead letter. It would seem from this investigation that legislation is having but little effect in the control of weeds in Ontario.

Legislation without education is, in the opinion of the writer, useless. It is only when the sentiment of those concerned is behind an Act that it can be successfully enforced

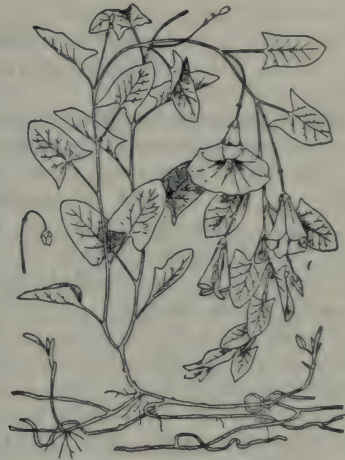
The object of these experiments is to get data from which definite statements may be made regarding the best methods of controlling the various bad weeds. It is hoped to include more weeds each year until exact information has been obtained concerning the eradication of most of the bad weeds in the province.

The results of this work are presented each year at the annual meeting of the Experimental Union at Guelph and the more important results are published in the annual report.

Six of these experiments have now



REDROOT PIGWEED



FIELD BINDWEED

and such sentiment can be created only by proper education.

In regard to education, considerable has been done by the Ontario Agricultural and Experimental Union. This organization in co-operation with the Department of Botany at the Ontario Agricultural College has carried on, during the past eight years, co-operative experiments in weed eradication. Over seventy farmers have conducted successful experiments. The weeds experimented with were—Perennial Sow Thistle, Twitch Grass, Bladder Campion or Cow Bell, Wild Mustard, Ox-eye Daisy, Field Bindweed, Wild Oats and Chess.

been carried on for eight successive years and some very valuable information obtained regarding the control of such weeds as Perennial Sow Thistle, Twitch Grass, Bladder Campion, and Wild Mustard. This information may be briefly summarized as follows:—

1. That good cultivation followed by rape sown in drills provides a means of eradicating both Perennial Sow Thistle and Twitch Grass.

2. That rape is a more satisfactory crop to use in the destruction of Twitch Grass than buckwheat.

3. That rape gives much better results in the eradication of Twitch

Grass and Perennial Sow Thistle when sown in drills and cultivated than it does when sown broadcast.

4. That thorough deep cultivation in fall and spring followed by a well cared for hoed crop will destroy Bladder Campion.

5. That mustard may be prevented from seeding in oats, wheat or barley by spraying with a twenty per cent solution of iron sulphate without any serious injury to the standing crop or to fresh seedings of clover.

In addition to this experimental and educational work of the Agri-

cultural and Experimental Union, the Department of Botany has carried on various experiments in the eradication of many of the worst weeds of the province. A special bulletin on "Weeds of Ontario" has been published which has been revised five times. Many thousand copies of this bulletin have been distributed throughout the province and there is still a continued demand for it. Articles also dealing with weed problems have been published from time to time in the agricultural press.

ALBERTA

BY JAS. McCAIG, M.A., PUBLICITY COMMISSIONER

THE system of control of weeds in the province is determined by the terms of the Act relating to the control of noxious weeds. The administration of the Act is placed in the hands of the superintendent of the Seed Branch. Seed and weed matters constitute the greater part of interest in the administration of this Branch. For the eradication of weeds the superintendent appoints a number of weed inspectors each year who operate during the growing season. The work of the inspectors opens earlier in the south than it does in the north and more are required in the south than in the north on account of the limitations of a grain system for the control of weeds. There are very few inspectors in the centre and north of the province. Last year there were twenty-nine inspectors altogether. Owing to the dry seasons of the past two years weeds have been making rather serious spread in the drifting areas, particularly Russian thistle.

The policy for 1920 has three aspects. The usual force of weeds

inspectors will be in the field. It is not the policy of the department to increase the stringency of the Act on the punitive side, but to secure the best co-operation possible by educational and advisory work. The use of the summerfallow in the south will have to go beyond the purpose of conservation to that of weed eradication. In the second place the department is figuring a rather active campaign of encouraging the keeping of sheep on the grain farms, by which summerfallows are kept black and pack and fertilized and the winter annuals found in the stubbles are eaten off in the fall. A third important means of combatting the weed nuisance is the extension of educational work through the school fairs. This year the number of school fairs has been considerably increased, and the identification of noxious weeds, and the institution of competitive collections will be carried on actively through the extension agents of the Department of Agriculture in co-operation with teachers and inspectors.

NEW BRUNSWICK

RECENT LEGISLATION

BY E. P. BRADT, B.S.A., SECRETARY FOR AGRICULTURE

THERE were two acts of importance to the agricultural industry passed at the recent session of the New Brunswick legislature. The first was an Act to amend Chap. 38 of the Consolidated Statutes of 1903 respecting the incorporation of cheese and butter manufacturing associations. This act is amended so that sub-section 1 of section 1 of said Chapter is repealed and the following is enacted in lieu thereof:

1. (1) At any time hereafter any five or more persons who desire to associate themselves together for the purpose of the manufacture and sale of dairy products may sign and acknowledge before a notary public, commissioner for taking affidavits to be read in the Supreme Court, or justice of the peace, in duplicate, and file in the office of the registrar of deeds of the county in which the business is to be carried on, a certificate in writing in the form mentioned in the schedule to this chapter, or to the same effect, together with the rules and regulations signed by such persons respectively.

The other is an Act to provide manufactured lime-stone to the farmers of the province of New Brunswick to be used as a fertilizer. This Act authorizes the Lieutenant-Governor-in-Council to borrow the sum of \$10,000 under the provisions of the "Provincial Loans Act" for the purchase of property in the parish of Simmons. This property, which is owned by H. G. S. Adams and his wife, contains a large quantity of lime stone. The Minister of Agriculture is authorized by the Act

to purchase a lime manufacturing plant and other machinery and equipment for the purpose of manufacturing and preparing lime rock for fertilizer.

This Act, for the supplying of ground lime-stone to farmers, should prove to be a very beneficial piece of legislation for New Brunswick. A survey of the soils of the province has indicated that they are decidedly acid in character, and that two or three tons of raw lime-stone rock per acre are necessary to correct the acidity. There are some exceptionally high testing lime quarries in the province, the one being taken over by the Government testing 94 per cent carbonate of lime.

The Department of Agriculture has entered into a contract with the Smith and Merrithew Company to deliver ground lime-stone to any station in the province for \$5 per ton freight prepaid. Previous to this year the same material has been costing the farmers from \$7 to \$10 per ton, depending upon the distance they were away from the quarries from which the lime was being supplied. This will effect an enormous saving to the farmers in the securing of ground lime-stone. There is an insistent demand for this material, due to the fact that wherever it has been used there the results have been very satisfactory.

The appropriations for agriculture for New Brunswick for 1920-21 voted at the recent session of the legislature are given in the table on the following page. Figures for 1919-20 are shown for comparison:

	1919-20	1920-21
Agricultural Societies.....	\$ 19,000 00	\$ 22,000 00
Brown-tail Moth Extermination.....	3,000 00	764 83
Butter and Cheese Factories.....	1,300 00	5,500 00
Bonus to Mud Dredges.....	1,000 00	1,000 00
Contingencies.....	3,200 00	2,500 00
Departmental Salaries.....	7,100 00	7,416 18
Departmental Travelling Expenses.....	2,200 00	2,700 00
Farm Settlement Board.....	500 00	
Encouragement of Horticulture.....	1,700 00	1,500 00
Immigration.....	10,000 00	10,000 00
Miscellaneous and Insurance.....	700 00	1,000 00
Encouragement of Poultry-raising.....	3,000 00	3,000 00
Encouragement of Stock-raising and Dairying.....	9,000 00	9,000 00
Standing Crop Competition and Seed Fairs.....	5,200 00	5,200 00
Bonus to Wheat Mills.....	5,000 00	5,000 00
Maritime Stock Breeders' Association.....	200 00	800 00
Lime-rock Crusher and Power.....	500 00	22,800 00
Exhibitions.....	16,700 00	18,000 00
	\$ 89,300 00	\$ 118,181 01

STALLION CERTIFICATES

DR. H. J. PUGSLEY, IN CHARGE OF STALLION ENROLMENT

IN the province of New Brunswick no important modifications have been made in the regulation governing stallion inspection and enrolment since the 26th day of April, 1918. The following system is used in the classification of stallions:

PURE-BREDS			
Class A Superior	Class A	Class A Average	Class A Unsound
CROSS-BREDS			
Class B Superior	Class B	Class B Average	Class B Unsound
GRADES			
Class C Superior	Class C	Class C Average	Class C Unsound

It may be stated that the Department of Agriculture does not issue certificates to unsound stallions, and consequently the three unsound classes are eliminated.

The organization for carrying on the work of inspection in this province is as follows: Usually an inspector is appointed to take charge of the work in each county. The stallion owners

are given notice through the press and by letter as far as possible, as to dates and the places in each county where stallions are to be assembled for inspection. In case of failure to present a stallion for examination on the date set, the inspector goes to the farm or stable where the horse is kept and the extra expense incurred is borne by the owner of the animal.

QUEBEC

ROOT COMPETITIONS

DISTRICT Representatives are authorized by the Minister of Agriculture of Quebec to organize two root competitions in their respective districts each year and to determine, among the most active and deserving farmers' clubs, those that should benefit from the special grant of \$40.00 offered. These root competitions are intended to induce farmers to give more attention to the growing of roots on their farm and by this means to improve the soil, at the same time insuring better food for the cattle during the fall and winter

seasons. Regulations are set forth in a circular which has been sent to the district representatives and farmers' clubs and these are to be strictly followed in organizing and conducting the competitions.

Each plot of roots must be at least one-half acre in area and either turnips, beets or carrots will be grown. The fields will be inspected by an inspector of the Department accompanied by the district representative and the following standard will be used in the judging of the plots entered:—

		Maximum of points	Points awarded
General Appearance, Considering;			
1. Stand of crop.....	5		
2. Uniformity of growth.....	5		
3. Sowing and thinning.....	5	15	
Cultivation.....		10	
Freedom from weeds.....		10	
Freedom from diseases and insects.....		10	
Quality of the Crop Considering:			
1. Purity and model type.....	5		
2. Crown.....	5		
3. Regular shape.....	5		
4. Freedom from bifurcations.....	5		
5. Texture.....	5	25	
Yield per acre.....		30	
Total.....		100	

The prize list will be arranged according to the schedule shown below and in no case does the Government grant exceed \$40 for any competition. Each district, where there is an

official representative, is entitled to two competitions, but in cases where such districts consist of two counties there will be one competition for each county.

Number of Competitors	Number of Prizes	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	Total
		\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
10	5	5 00	4 00	3 00	2 00	1 00	.....	.....	.....	.....	15 00
18	6	7 00	6 00	5 00	4 00	3 00	2 00	.....	.....	.....	27 00
21	7	8 00	7 00	6 00	4 00	3 00	2 00	1 00	.....	.....	31 00
24	8	9 00	7 00	5 00	4 00	3 00	3 00	2 50	2 00	.....	35 50
27	9	9 50	7 00	6 00	5 00	4 00	3 00	2 50	2 00	1 00	40 00

ONTARIO

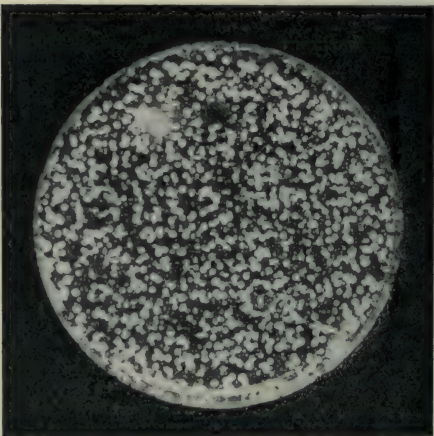
YEASTS AND MOULDS IN BUTTER

BY T. H. LUND, B.S.A., DAIRY BACTERIOLOGIST, ONTARIO AGRICULTURAL COLLEGE, GUELPH

A study of the yeast and mould content of creamery butter, work upon which was commenced in 1918, was carried on again during the past season on a more extended scale in the Bacteriology Department of the Ontario Agricultural College, Guelph. Yeast and mould counts of 285 different lots of butter have been made, samples being secured from the following sources:

Our object in carrying on this work has been to secure information on the following points:

- 1. Yeast and mould contest of raw vs. pasteurized cream butter.
- 2. Efficiency of creamery pasteurization and extent of recontamination of pasteurized cream butter as indicated by yeast and mould counts.



CULTURES OF PASTEURIZED CREAM BUTTER FROM TWO ONTARIO CREAMERIES
(1/10 C.C. OF BUTTER IN EACH CULTURE)

- 1. 850 YEASTS PER C.C. OF BUTTER. EFFICIENCY FAIR
- 2. 50,000 YEASTS PER C.C. OF BUTTER. EFFICIENCY FAIR

Experimental churning, Dairy Department, O.A.C.	46
Provincial Butter Grad- ing Station, per Mr. Scott	192
October entries, Dom- inion Scoring Contest, Montreal, per Mr. Barr.	30
"All Canada" Scoring Contest, Winnipeg, per Mr Gibson.....	9
Miscellaneous samples..	8
Total.....	285

- 3. Relation of yeast and mould content of butter to flavour and keeping quality.
- 4. Correlation, if any, between the yeast and mould counts of butter with the findings of the Storch test.

Eighteen Ontario creameries (14 pasteurizing and 4 not pasteurizing) contributed 180 samples from different churnings from May to October, yeast and mould counts being forwarded weekly to Mr. Herts at London, who passed them on to the

creamery inspectors and to the creamery managers or buttermakers concerned. From these counts we were able to get a pretty fair idea of yeast and mould content of Ontario butter as manufactured during the warmer months of the year.

Quantitative determinations of *oidium lactis*, yeasts and *penicillium* were made of each sample. *Oidium lactis* is a variety of mould found in large numbers in old sour milk and cream. Yeasts are active fermenters and enzyme producers. Large numbers of yeasts are found in farm separator cream as delivered at the creamery, particularly during the warmer months of the year. *Penicillium* is the common blue-green mould of bread. It is one of the chief causes of mouldy butter as generally seen. Spores of this mould are common in the air, particularly when any dust has been raised, and so are practically always present in collected cream.

In creameries where pasteurization is not practised the yeast and mould counts usually run high. This is what we would naturally expect as no steps have been taken to destroy the large numbers of these organisms which are present in gathered cream. The effect of the warmer months on these counts is plainly visible, showing a marked increase in July and August over what occurs in May. The butter from one of the creameries where pasteurization was not practised showed large numbers of *penicillium* mould spores; under favourable conditions of temperature and of moisture such butter is practically certain to go mouldy, particularly if the salt content is at all low.

One creamery where the cream is warmed up to 120° F. shows that the influence of such treatment upon germ life in the cream seems to be stimulative rather than destructive, and we have no hesitancy in condemning the use of such a low temperature as scientifically unsound.

In eight creameries where pasteurization is practised, or supposedly

practised, the counts as a whole are considerably lower than where pasteurization was not practised. The presence of yeast and moulds in pasteurized cream butter is due to one or both of two causes: (a) Inefficient pasteurization, that is to say, the yeast and mould germs in the cream are not all destroyed. (b) Recontamination where efficiently pasteurized cream becomes inoculated after pasteurization either by the addition of small quantities of raw cream, by passage through unclean pipes, pumps, churns, etc., or from dust and in other ways. If the pasteurization is efficiently carried out and reinfection of the pasteurized cream prevented, the yeast and mould content of the butter should be *nil*.

The relation of yeast and moulds in butter to flavour and keeping quality is a more difficult matter to determine, and our investigations on this point have not proceeded far enough to justify us in coming to any final conclusions at the present time. In a general way the work of the past year with Ontario butter has shown us that pasteurized butter containing large numbers of yeasts, may, and often does, score up well when fresh, but after four months in storage it will usually score lower than four-month-old pasteurized butter containing fewer yeasts which did not score quite so high perhaps as that with high yeast content when first made.

The thirty counts of the October entries in the Dominion Scoring Contest, 1919, show that creameries in other provinces than Ontario are manufacturing butter containing large numbers of yeasts at times, while, on the other hand, some quite low counts have been obtained. Butter from one British Columbia creamery gave a count of two yeasts only per c.c., the next lowest count being from a whole milk creamery in Quebec with a count of 140 per c.c. High yeast content butter among the October entries in many cases scored up well on flavour, two samples of

pasteurized cream butter from Manitoba and Prince Edward Island each containing over 100,000 yeasts per c.c. scored 42.5 and 43 respectively, while two lots from Nova Scotia and Quebec containing 45,000 and 44,000 yeasts per c.c. scored 42.5 and 43. These four lots got the four highest scores, which fact is rather remarkable. Evidently there is something about yeasty butter when fresh which tickles the nostrils and palate of the judges, which fact is quite in line with our knowledge of wines where yeasts are involved in the production of pleasant and desirable bouquet. In the case of wines we know that there are both desirable

and undesirable varieties of yeasts, and there is no reason to my mind why this should not be so in the case of butter too, as far as its flavour and aroma when freshly made are concerned. It is impossible to draw any general conclusions from the keeping quality of the few lots mentioned above. It is hoped that yeast and mould counts will be made of all lots entered in the Dominion Scoring Contest during 1920, so that some definite data on this point may be obtained by the end of the year.

No correlation between yeast and mould counts of butter and the findings of the Storch test has been found.

CANADIAN VETERINARY RECORD

THE first number of a new magazine, which will be devoted to the interests of the veterinary profession, has just been published. This magazine is the "Canadian Veterinary Record" and is the first Canadian magazine devoted to veterinary science. It is the outcome of a considerable amount of hard work and hard thinking on the part of a number of the senior students of the Ontario Veterinary College who spent much time last fall in trying to ascertain if a satisfactory veterinary journal could be published in Canada. Only two issues will be

published during the present year, but if these meet with approval and success it has been decided to convert the journal into a quarterly. The aims of the magazine are to bring into closer touch with each other veterinarians in the different provinces, to encourage the advancement of veterinary science, and to act as a medium to further the development of the veterinary profession.

During the past year there has been considerable agitation with a view to raising the status of the veterinary profession and the appearance of this magazine would indicate that direct results are being achieved.

MANITOBA

PLANT PATHOLOGIST FOR AGRICULTURAL COLLEGE

THE appointment of Dr. Guy R. Bisby, Ph.D., to the position of Plant Pathologist at the Manitoba Agricultural College is announced. His duties commence June 1st.

Dr. Bisby has been working largely with potato diseases in the States of

Maine and Minnesota and has done considerable teaching of plant pathological and mycological subjects at the University of Minnesota. He also acted as leader of a co-operative potato spraying project for the advisory board of American plant pathologists.

Since 1910 Dr. Bisby has been engaged in biological study and investigations. His research work and investigations being carried on in South Dakota State College where he specialized in botany and plant pathology in 1912. He was laboratory assistant in the Brooklyn Botanic Gardens in 1913 and spent the following two summers with the Ameri-

can Potato Corporation, Presque Isle, Maine. Following this he took a graduate course securing the M.A. degree from Columbia University and was later assistant in botany at the Perdue University. He received his Ph.D. degree in 1918 and until his recent appointment has been assistant professor of plant pathology at the University of Minnesota College of Agriculture.

SASKATCHEWAN

NEW MINISTER OF AGRICULTURE

Charles McGill Hamilton, M.L.A. for Weyburn, new Minister of Agriculture in the Saskatchewan Government, entered upon his duties in April and Hon. C. A. Dunning, who has combined the duties of the portfolio of agriculture and provincial treasurer since the resignation of the Hon. W. R. Motherwell, will now devote his entire attention to the affairs of the treasury department and the recently enlarged Bureau of Labour and Industries.

The new Minister was born at Whitechurch, Bruce County, Ontario, in 1878, and was educated in the public schools of Ontario and Saskatchewan. He attended high school and normal school at Regina and later entered Manitoba College at Winnipeg. After teaching in the vicinity of Indian Head for several

years he moved to the Weyburn district in 1901 where he took up a homestead and is now farming on an extensive scale.

Mr. Hamilton has been very prominent in municipal affairs of the province and has served in an executive capacity in numerous associations and organizations, being for a number of years president of the Saskatchewan organization of rural municipalities; president of the Grain Growers' local at McTaggart; director of the Saskatchewan Municipal Hail Insurance Association; and chairman of the Western Municipal Council since its formation. He was made a director of the C.N.R. after the federal Government took over that road in September but he resigned this post when he decided to accept the nomination as member for Weyburn.

AGRICULTURAL LEGISLATION

A BRIEF review of the legislation affecting agriculture enacted at the recent session of the Saskatchewan legislature is contained in the following paragraphs.

An Act Respecting the Department of Agriculture, Chapter 9

Owing to the many and varied activities of the department of agri-

culture it was found necessary to revise the act passed in 1909. Since the original act was passed in 1909 the scope of the department has been greatly extended and many new branches have been added.

This act brings up to date the legitimate activities which the department now embraces.

An Act to Provide Relief in Local Improvement Districts, Chapter 34

This Act provides that the minister of agriculture may make advances of flour, coal and fodder in local improvement districts to such farmers as may be unable to purchase the same without assistance, through failure of crops or other adverse conditions.

It is also provided that the minister may take lien notes or agreements charging the lands of the applicant with repayment of advances and interest at seven per cent.

The Act is made retrospective as of and from October 1, 1919.

An Act to Amend the Agricultural Societies Act, Chapter 45

In the existing law the number of directors of a society may be either nine, twelve or fifteen, as the society itself deems fit.

By this act the number is left open and this provision applies retroactively as of and from November 1, 1919.

An Act Respecting the Manufacture of Dairy Products, Chapter 46

While this act is a consolidation of existing legislation dealing with the regulation and manufacture of dairy products with the provisions relating to the organization of co-operative creameries removed since these organizations were amalgamated two years ago, a number of important new provisions are included.

Among other things the act provides for removing discrimination in the amounts paid by manufacturers for milk, cream or butter fat from different districts.

The minister is given power to close any plant which may be found to be insanitary and is also given power to have plans for all new butter and cheese factories submitted to him for approval before erection.

Provision is still held for the appointment of a dairy commissioner for the province.

An Act Respecting the Restraining of Animals Running at Large, Chapter 47

This Act contains many important amendments to the existing law, one of which is the change in the definition of the word "estrays." It is now intended that this word shall mean an animal which, while lawfully running at large, has strayed from its accustomed forage ground or has joined a band, herd or flock other than that of its owner from which it cannot be driven away or an animal which has broken into premises enclosed by a lawful fence.

No hard and fast free range areas is established in the northern part of the province as contemplated by the existing law. Free range and herd law is by this new Act left to the discretion of councils and all municipalities in the province.

Relief is afforded from arbitrary decisions of councils wanting free range without the consent of the rate-payers. A referendum is now provided for under the new Act. The council of a municipality shall on petition of not less than forty resident ratepayers submit the question to the electors as a referendum and the decision of the electors is to be binding on the council.

It is also now provided that a pound to serve a municipality may be located in one or more villages lying within the outer boundaries of such municipality.

Provision is also made whereby the minister of agriculture may from time to time prescribe the fees which may be collected by the poundkeeper for the care and sustenance of impounded animals.

An Act to Amend the Game Act, Chapter 50

The most important of the numerous amendments which make up this act has to do with the shooting of prairie chicken. For the last three years there has been a close season on prairie chicken the year

round. Under this amending act there is a limited open season provided of two weeks from October 16 to October 31, for prairie chicken.

The act also permits the killing of female caribou and further protects muskrats south of township 52, the season being open only from March 1 to May 1.

The destruction of beaver is prohibited, and it is now provided that resident farmers must take out a license before they can hunt birds and a fee will also be necessary for a trapper's license.

An Act for the Licensing and Regulation of Produce Commission Merchants, Chapter 51

This act affords protection to the farmers from unscrupulous produce commission merchants similar to that afforded them in handling grain through grain commission agents.

Any person desiring to carry on business as a produce commission merchant in the province must make application to the minister of agriculture, enter into a bond of \$2,000 and conduct his business under license.

Regulations are laid down in the act as to the general conduct of his business, the merchant being required to make reports from time to time to the minister. Stringent penalties are provided for those who violate the provisions of the act.

An Act Respecting the Purchase and Sale of Eggs, Chapter 52

One of the chief objects of this act is to encourage dealers to exercise care in the handling and marketing of their eggs while another object is to discourage the practice of some producers of keeping eggs too long a time, resulting in their deterioration.

The act provides for the licensing of retailers handling eggs and they are also prohibited from buying or selling eggs unfit for human consumption.

Retailers are required to maintain some suitable place for the candling of eggs and cards must be placed in

cases to identify eggs and to show that they have been candled.

To protect the producer power is given to the minister of agriculture to make regulations relating to the marketing of eggs and where it is found impracticable for the retailer to candle eggs in the presence of the producer, regulations are provided for the recandling at a time when it can be done in his presence.

The act comes into force on June 1, 1920.

An Act to Amend an Act Respecting the Saskatchewan Co-operative Elevator Company, Limited, Chapter 58

By this amending act power is taken to authorize the government from time to time and on such terms and conditions as may be agreed on with the company to lend to the company for the purpose of aiding in the construction or extension of terminal elevators at points outside the province or towards reimbursing the company, moneys already expended for that purpose, a sum not exceed fifty per cent of the cost or estimated cost of such elevators or of the extensions.

While no amount is specified in this act, it was stated in the legislature by Premier Martin that it was proposed to loan one million dollars for terminal construction in return for which the government will take a first mortgage on the entire plant including the hospital elevator.

An Act to Amend an Act to Incorporate the Saskatchewan Co-operative Creameries, Limited, Chapter 72

This Act contains only one or two minor changes in principle. A change has been made in the definition of the word "local" in order that shareholders who have purchased stock, residing in districts remote from local cold storage plants, may secure representation in the newly organized concern.

The company is also given the power to increase its capitalization and provision is made to protect holders of stock in the old companies who have not yet converted their shares into stock of the amalgamated organizations.

An Act to Amend An Act to Incorporate the Northern Saskatchewan Co-operative Stock Yards, Limited, Chapter 79

An Act to Amend An Act to Incorporate the Southern Saskatchewan Co-operative Stock Yards, Limited, Chapter 80

These two acts contain amendments of only secondary importance, no new principles being involved.

The amendments have to do with the disposition of surplus funds from trading operations and grants that may be made to the companies.

An Act to Amend The Farm Implementation Act, 1917, Chapter 65

The existing law includes schedules in the form of contracts to be used for the sale of farm machinery, the contracts themselves containing some blanks. Owing to the fact that some companies were using the printed forms with the blanks for the interest rate filled in as "nine per cent." this Act is designed to meet this abuse.

The Act now provides that all blanks in contracts under the existing law must be filled in in hand writing or else the contract becomes invalid.

An Act to Amend The Noxious Weeds Act, Chapter 39

The only change in this act is the elimination of the word "growing" from a number of its provisions, it being found in actual practice a difficult matter very often to determine whether a weed is growing or not.

An Act to Provide for Payment for Certain Wolf Bounties, Chapters 41

This act has been found necessary by reason of the fact that following the report of "The Wolf Bounties Act" of last session a number of wolf bounty certificates were issued by inspectors of wolf pelts to those persons who had killed prairie wolves before the inspectors could be notified of the change in the law. These certificates having been cashed and accepted by municipalities and banks and others, it has been felt expedient that the holders of such certificates should be placed in the same position as if "The Wolf Bounties Act" had not been repealed.

The act makes provision for the payment of the amounts due under the certificates issued and also makes the transaction legal and complete.

An Act to Amend The Saskatchewan Farm Loans Act, Chapter 71

This act gives the farm loans board the same power as other mortgage companies to make advances for seed grain. The board is also given power to blanket other existing mortgages.

An Act Respecting Irrigation, Chapter 84

This Act provides for the formation of irrigation districts composed of a parcel or parcels of land on which any dam, weir, flood gate, reservoir or other contrivance for the carrying of water may be erected.

The Act sets out the procedure to be adopted to form such an irrigation district as well as the methods of irrigation and how irregularities may be dealt with.

An Act To Amend The Reclamation Act 1917, Chapter 75

By this act provision is made for an increase in the minimum value of improvements which may be undertaken under The Private Ditches Act.

The value is raised from \$2,000 to \$5,000.

APPROPRIATIONS FOR AGRICULTURE.

Appropriations voted at the recent session of the Saskatchewan legislature to be devoted to agriculture and

administered by that department amount to \$234,900 as compared with last year's vote of \$516,400. Very considerable reductions were made in the allotments for the live stock industry and for the improvement and production of field crops. The appropriations are as follows:—

	1919-20	1920-21
Assistance to General Agricultural Interests.....	\$ 103,500 00	\$ 90,500 00
Assistance to Live Stock Industry.....	244,600 00	39,200 00
Assistance to Dairy and Poultry Industry.....	17,200 00	14,000 00
Publicity and Statistical Work.....	26,200 00	15,900 00
Improvement and Protection of Field Crops.....	101,500 00	39,500 00
Game Protection and Musuem.....	23,400 00	25,300 00
Co-operation and Markets.....		10,500 00
	\$ 516,400 00	\$ 234,900 00
Details of Major Service		
Expenditures under Agricultural Societies Act.....	80 000 00	80,000 00
Grants for Seed Improvement (to be recouped).....		7,000 00
Administration of the Horse Breeders' Act.....	7,000 00	9,000 00
General Live Stock Industry Services.....	204,000 00	4,000 00
Saskatchewan Winter Fair Board.....	8,000 00	8,000 00
Destruction of Wolves.....	7,800 00	6,000 00
Administration of Dairy Products Act and General Services.....	10,500 00	9,000 00
Purchase of Butter Samples (to be recouped).....		1,000 00
Advancement of Poultry Interests.....	4,500 00	1,000 00
Advancement of Methods for Control of Noxious Plants and Insects.....		25,000 00
Gopher Destruction.....	2,000 00	4,000 00
Providing Exhibits at Fairs outside Saskatchewan.....	2,000 00	5,000 00
To Promote the Co-operative Marketing of Farm Products.....		3,000 00
Agricultural Education		
Agricultural Extension Work.....	30,000 00	38,000 00

EXHIBITS AT INTERNATIONAL AND ROYAL FAIRS

BY W. A. MACLEOD, EDITOR OF PUBLICATIONS

ON behalf of the Saskatchewan government the Minister of Agriculture has agreed to pay the transportation charges on Saskatchewan live stock entered for the International Live Stock Show at Chicago and the Royal Exhibition at Toronto.

It has been decided that a joint exhibit of not over two car loads of

Saskatchewan live stock be sent this fall to the two big shows. There are certain conditions to be followed in the agreement entered into by the Minister of Agriculture. One is that no stock should be included in this exhibit that had not competed in at least one of the four large Saskatchewan shows, namely Regina

or Saskatoon, summer exhibitions or winter fairs.

The result of the conference between the members of the live stock board and the Minister was completely satisfactory to the board and steps

will immediately be taken to ensure the earnest and hearty support of the board in securing the best possible exhibits from this province well fitted.

THE OCCURRENCE OF GID IN SHEEP

BY DR. A. E. CAMERON, PROFESSOR OF BIOLOGY AT UNIVERSITY OF SASKATCHEWAN

THE immediate purpose of this article is to call the attention of Canadian flockmasters and more especially those of Western Canada, to the presence of the gid parasite in Saskatchewan. This parasite is the more important and, at the same time, the most destructive enemy of sheep, and steps should at once be taken with a view to its eradication wherever it is found. So far as the author is aware, there

apparently acquainted with the symptoms associated with the disease. In no single case, however, could my informants state positively that they had actually seen the parasite. Steps are now being taken to make a complete survey of the

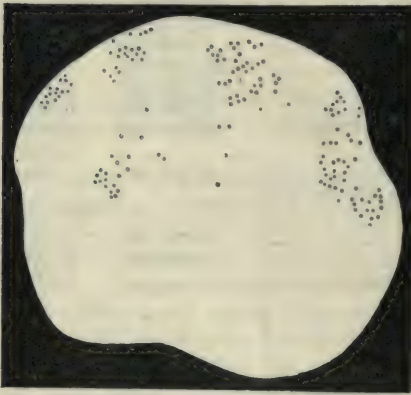


FIG. 1. GID PARASITE FROM BRAIN OF SHEEP ABOUT NATURAL SIZE (FROM BUREAU OF ANIMAL INDUSTRY CIRCULAR 165). SMALL CIRCLES ARE TAPEWORM HEADS DEVELOPED ON WALL OF CYST

are no authentic records of the occurrence of this parasite in Canada, and it is, therefore, interesting to record its discovery among the sheep at the farm of the University of Saskatchewan, at Saskatoon, during recent months. It is probable that the disease has been more or less prevalent in the province during the past few years, if one may judge from the opinions of sheepowners who are

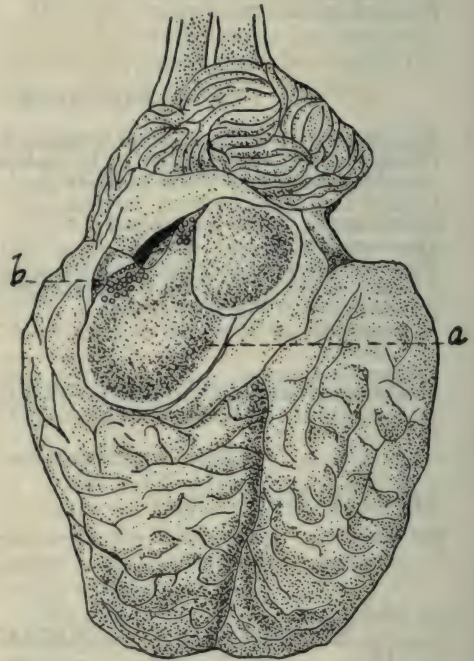


FIG. 2. BRAIN OF GIDDY SHEEP, SHOWING GID PARASITE. *a.* GID PARASITE OR BLADDERWORM. *b.* HEADS ON BLADDERWORM. (AFTER NUMAN, 1850, PL. 1, FIG. 1)

province with a view to extending our knowledge of the distribution of the parasite.

Altogether sixteen sheep, representing six per cent. this year have succumbed to the effects of the gid parasite in the flock at the University

farm which includes two hundred and thirty animals. Of this number the greater percentage was of the Shropshire breed, there being also one Rambouillet ram, one Southdown ewe, and one grade ewe. In Montana, where the disease has been known since 1904, it is estimated that the total loss from gid amounts to at least \$10,000 in some years. In this state the infected range occurs in the northern portion and covers an area of 400 miles long, and about 200 miles wide. The risk of the disease being introduced into Canada from Northern Montana was realized in 1910, by Dr. M. C. Hall,

that the more widely distributed the disease becomes, the more difficult and the more costly will be its eradication.

LIFE-HISTORY OF THE GID PARASITE

The disease termed as gid is also known as "sturdy" or "staggers" and is caused by the presence in the brain or, rarely in the spinal cord,



FIG. 3. HEAD OF DEVELOPING TAPEWORM DISSECTED AWAY FROM THE WALL OF A GID BLADDERWORM. (FROM BUREAU OF ANIMAL INDUSTRY BULLETIN 66)

of the United States Bureau of Animal Industry, and it is not unlikely that this infected area represents the source from which the parasite has spread into Saskatchewan, and perhaps other western Canadian provinces.

In European countries gid has been responsible for heavy annual losses among flocks for more than sixty years, notwithstanding the fact that the methods of its suppression have been well known. Among some flocks the mortality has reached as high as thirty-five per cent due to this cause alone. It would be well for Canadian sheepowners to remember

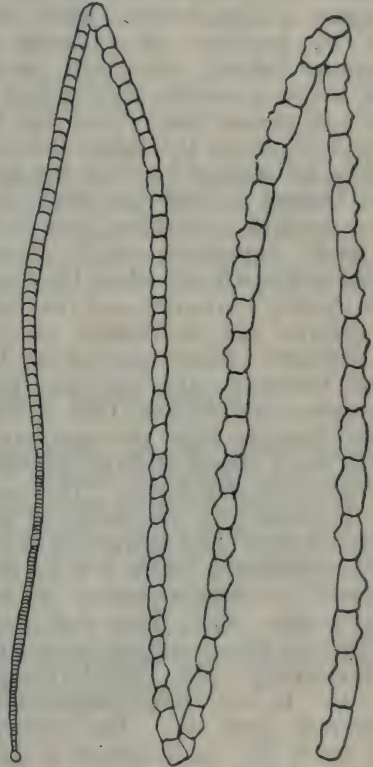


FIG. 4. THE ADULT GID TAPEWORM FROM THE INTESTINE OF THE DOG. NATURAL SIZE. (FROM BUREAU OF ANIMAL INDUSTRY CIRCULAR 165)

of a bladderworm (fig. 1), the young stage of a tapeworm which is found in the intestine of the dog. In appearance the bladderworm is a rounded bag with a very delicate transparent wall, the internal cavity being filled with a watery fluid. The average size of the bladder is that of a hazel-nut, but some of them may be as large as a hen's egg.

A close examination of the bladder reveals a number of small white objects, not larger than pin-heads, projecting into the cavity containing the fluid. Each one of these minute objects, of which there may be as many as one hundred to five hundred, is a tapeworm head.

Should this bladderworm be fed to a dog, the bladder is digested but the tapeworm heads (fig. 3) become attached to the walls of the intestine by means of sharp hooks. Here they grow by budding off a chain of segments behind the head until, after about a month they attain a length of two or three feet (fig. 4). In each tapeworm the older segments as they are pushed back by the new ones, formed behind the head, become mature, containing hundreds of small tapeworm eggs. These mature segments are then liberated from the dog's intestine and reaching the exterior are distributed around the pastures. Sheep grazing on infected pastures take the eggs into their stomachs. Under the action of the digestive juice the eggs hatch and a small round embryo emerges provided with six hooks. This embryo burrows into the walls of the sheep's stomach and enters one of the small bloodvessels where it is carried passively to different parts of the sheep's body. Only those that reach the brain or spinal cord are successful in developing into bladderworms. (fig. 2). In any other organ they degenerate and die. The embryo may reach the brain about 8 days after the onset of the infection, but the bladder does not reach its full development with the characteristic tapeworm heads until 2 or 3 months have passed.

The pressure of the developing cyst in the brain causes the sheep to turn in circles, the head being carried on one side. These symptoms occur at intervals but become more pronounced as time advances, until, seven or eight months after infection,

the final symptoms appear. The affected animal becomes more and more emaciated owing to loss of appetite. The eyes are fixed and pupils dilated. Obstructions are not readily avoided, and a tendency to lag behind the flock develops. The characteristic symptom of moving in circles becomes more pronounced, and at the end of nine months after infection the animal dies of paralysis or from the effects of exhaustion.

In many instances sheepowners confuse the symptoms of gid with that of loco disease, which is caused by the eating of loco weed. This weed grows extensively on the prairies and is responsible for poisoning that causes sheep to become nervous and uncertain in their movements. Animals thus affected do not, however, show the regular repetition of actions that characterize giddy sheep.

Another parasite that affects sheep, namely the grub of the sheep bot-fly, is sometimes considered to be the causative agent of gid. It confines its attentions to the nose and frontal sinuses of its host, and affected sheep are readily distinguished by a catarrhal condition. Sheep that are suffering from gid may also harbour the bot-fly grub as was shown in several cases examined by the author in post mortems at Saskatoon.

ERADICATION OF GID

From the foregoing account of the life-history of the gid parasite it is evident that the heads of all sheep that die from gid should be destroyed, so that they will not be accessible as food to dogs. This may be done effectively by burning the heads, or removing the brains and treating them with formaldehyde.

Sheep-dogs should be treated once a year at least with a vermifuge,

which will rid them of tapeworm. This should be administered preferably at the time when the outbreak of gid for the year is over. The tapeworms passed by the dog should

be burnt or destroyed by covering them with quick lime.

All stray dogs should be destroyed, and the same applies to coyotes, which may also harbour the tapeworm of gid.

IRRIGATION PROJECTS

BY F. H. AULD, DEPUTY MINISTER OF AGRICULTURE

IRRIGATION projects in Saskatchewan, although small, are fairly numerous and are located mainly in the Cypress Hills region in south-western Saskatchewan. As water rights in Saskatchewan are administered by the Department of the Interior, Ottawa, the greater part of the work done to popularize irrigation has been fostered by that Department, and little has been done by the local government beyond

assisting the Western Canada Irrigation Association with an annual grant in recognition of its work.

At the last session of the Saskatchewan Legislature an Irrigation Districts Act was passed and under its provisions reservoirs will no doubt be constructed to conserve more of the spring run-off for use during the growing season. The principal use of the land under irrigation in Saskatchewan is the growing of forage crops.

ASSISTANT BUTTER GRADER APPOINTED

MR. H. A. Hanson, has been appointed assistant butter grader and creamery instructor with the Dairy Branch of the Saskatchewan Department of Agriculture and will enter upon his duties at once. He was born in Denmark where he received a thorough training in dairy work and came to this country six years ago. Since then he has been

making butter in the United States and Canada, becoming thoroughly familiar with dairying conditions in this country. Last year he was in charge of the Dauphin Milling and Creamery Company plant at Preeceville, Sask., and during the past winter he attended the special course at Iowa State College.

NEW DIRECTOR CO-OPERATIVE ORGANIZATIONS

BY W. A. MACLEOD, EDITOR OF PUBLICATIONS

MR. J. F. Booth, field representative with the provincial department of agriculture in 1917 and district representative with the department in 1919, has been appointed to succeed W. W. Thomson as director of the co-operative organizations and market branch of the department in Saskatchewan. Mr. Thomson resigned recently to take charge of the co-

operative wool marketing operations of the wool growers of Saskatchewan and Manitoba.

Mr. Booth came to Western Canada when a child and received his early education in Brandon, Manitoba, later removing to this province where he attended public and high school, matriculating at Regina College, afterwards graduating from the Regina Normal School and teaching

for a few terms and then entering the University of Saskatchewan.

While at the University he specialized in field and animal husbandry work and won an undergraduate scholarship in 1917. At the 1919-20 session of the college of agriculture,

Mr. Booth was a special lecturer, and he is well known in many parts of the province through his lectures on the Better Farming Train, at short courses, and through his work as field and district representative.

RURAL MUNICIPALITIES CO-OPERATING TO DESTROY GOPHERS

BY M. P. TULLIS, WEEDS AND SEED COMMISSIONER

AS a result of requests from various municipal councils and farmers organizations, for a provincial-wide plan of co-operation to poison gophers, with a view to effectively reduce the numbers of this very destructive pest, enquiries have been made into schemes adopted in different sections of the prairies of Canada and the United States. It has been found that concerted effort over a wide area early in the spring is a necessity for success, and can best be accomplished by establishing poison mixing centres, where farmers call, and all poison is mixed under a competent supervisor.

Such a plan of organization has been suggested to municipal councils as a basis for co-operating. The following indicates the substance of it.

1. Sufficient poison whether strychnine or a manufactured preparation to be purchased to cover all infested land.
2. Resident ratepayers to be engaged to distribute poison on unoccupied lands, adjoining, as well as their own.
3. (a) Two poison mixing centres to be established for each councillor's division or twelve per municipality.
- (b) A supervisor of mixing bait to be appointed to travel from one station to another.
- (c) Poison mixing week to be held before May 15th and be well advertised.
- (d) Farmers to bring their grain to the centre on the advertised date where the supervisor will see that the bait is properly prepared.

A half day spent at each station would permit the supervisor to cover the municipality in a week.

The purpose of mixing centres is intended to bring about;

- (a) Early poisoning (before the young appear).
- (b) Co-operative and uniform effort as nearly provincial-wide as possible.
- (c) More carefully prepared bait.

It is expected that a considerable number of rural municipalities will adopt the plan above outlined, in principle at least, since it is generally recognized that for best work the municipality, as a unit of effort, is too small and the larger the area uniting, the better.

SCHOOL COMPETITION

This year the boys and girls of Saskatchewan asked for another try to help rid the province of the gopher pest and so be of further service in saving the farmer's crops. The Department of Agriculture, and business men, are offering prizes to encourage the children to greater efforts.

The following are some of the best ones;

Six Shetland Ponies; Twenty-four registered pure bred (young) pigs; pair of ewes and their lambs; two (\$50.00) Victory bonds; registered Marquis wheat; hot lunch outfits; phonographs; tennis outfits; and footballs.

Approximately 2,750,000 gophers have already been destroyed by Saskatchewan children, and it is hoped that 2,000,000 will be accounted for this spring.

ALBERTA

THE WHEAT CROP AND THE PART PLAYED BY THE INTRODUCTION OF NEW STRAINS AND HYBRIDS

G. H. CUTLER, B.S.A., PROF. OF FIELD HUSBANDRY, UNIVERSITY OF ALBERTA

ACCORDING to statistics the wheat crop in Alberta stands second in importance—oats taking the first position. Wheat however, has been grown since the early days of settlement. Both winter and spring wheat are grown quite extensively—the former less than the latter. The acreage devoted to winter wheat reached its peak some seven or eight years ago. Since that time it has slowly declined in popularity until today only some fifty thousand acres are being grown. Statistics for spring wheat on the other hand, show that the acreage for this cereal has rapidly increased, especially during the past four or five war years, when it has more than trebled.

WINTER WHEAT

The early introductions of winter wheat so far as can be ascertained were Dawson's Golden Chaff, Turkey Red, and later Kharkov. These probably came to Alberta with settlers from Ontario and the United States. Dawson's Golden Chaff was discovered in Ontario while the others came from Kansas, although originally from Russia.

SPRING WHEAT

In spring wheat the following introductions contributed a valuable service, especially to the drier areas, Red Fife, Ladoga, Blue Stem, Little Club. The first two came from Ontario although Ladoga was brought into Canada by the Central Experimental Farm System. The last two mentioned were introduced by settlers from Montana, Idaho, Washington, and other States.

Owing to the fact that the most popular of these, viz., Red Fife, required a long season in which to

ripen, and was therefore frequently frosted, there became apparent an imperative need for earlier varieties.

Several new cross-bred wheats were introduced about this time by the Dominion Experimental Farms. Of these the first to claim attention was Early Riga, an early ripening hard red wheat. Later Huron, Stanley, and Preston, and others of lesser import were adopted. Of these and earlier varieties, Huron, Stanley, Little Club, and Ladoga have persisted until today, the first and last mentioned continuing to serve a large field of usefulness in the central and northern sections of the province.

More modern than any of the aforementioned and by all means of infinitely greater value to the wheat growers of Alberta is the Marquis wheat—perhaps the most wonderful achievement in the realm of wheat breeding. It combines in one wheat, in a most unusual degree, the qualities of high yield, high quality, medium early maturity, non-shattering propensity, red colour and strong medium long straw. Marquis has supplanted nearly all other wheats and today stands without a peer. It is true certain of the newer strains have a greater suitability for special conditions of soil and climate—none of them however, begin to fill such a wide field of usefulness.

Later introductions than Marquis are:—Early Red Fife, a pure line strain out of Red Fife, developed by the Dominion Cerealists; Kitchener, a new wheat introduced by Seager Wheeler of Rosthern; Red Bobs, another production by the same grower; Prelude and Pioneer, early hybrid wheats produced by the Dominion Cerealists; Kubanka, a dry land wheat introduced by the Department of Agriculture, Washington, D.C., and finally Ruby—the latest pro-

duction to be brought out by the Dominion Cerealists.

When the writer was appointed head of the Department of Field Husbandry in 1917, in the University of Alberta, steps were taken immediately to make a careful survey of the needs of the wheat growers in the province. Owing to the increasingly growing demand for more and more bread stuffs, it was plainly apparent that wheat as a source of food would long continue to be in demand, even after hostilities ceased, and that western Canada with her cheap lands would be able to compete on very favourable grounds with other wheat growing areas.

Large numbers of wheats had already been brought together by

Dean Howes and these were added to by the writer. It was apparent that there were many sections where early fall frosts occurred, for which more suitable wheat must be produced. Selection and breeding experiments were inaugurated immediately, and it is hoped that definite contributions can be made that will enable the greatest number of farmers in Alberta to grow wheat, even though in many instances it be only a small acreage.

Much head selection work in the standard varieties of wheats has already resulted in making it possible for the University to supply large numbers of farmers with pure stocks of good seed to serve as the foundation for pure seed production.

FARM CROPS UNDER TEST AT FORT SASKATCHEWAN

AT the institutional farm connected with the provincial penitentiary at Fort Saskatchewan, Alberta, various classes and varieties of farm crops have been under test. White, hullless barley over a period of four years produced an average of sixty bushels to the acre; Northwestern Yellow Dent

corn gave a satisfactory crop of fodder amounting to an average over five years of fifteen tons per acre; Arthur peas produced twenty-four bushels to the acre; a mixture of alfalfa and sweet clover last year gave three cuttings, the average yield of hay being two and a quarter tons per acre.

BRITISH COLUMBIA

SHEEP EXTENSION WORK

BY W. T. MCDONALD, B.S.A., LIVE STOCK COMMISSIONER

THE British Columbia Department of Agriculture through officers of the Live Stock Branch have been rendering every possible assistance to promote the co-operative marketing of wool which is now done to a considerable extent in this province. In most cases this wool is shipped to the Canadian Co-operative Wool Growers' Association, Weston, Ont. At the present time a campaign is being conducted for the furtherance of this co-operative marketing.

Sheep sales have been held under the auspices of the British Columbia Stock Breeders' Association and assistance is being given in the payment of freight to and from the sales. This association also pays one-half of the transportation charges paid by its members on the pure-bred sheep which they purchase. Literature regarding the preparation of wool for marketing is also sent out to breeders. The provincial Department of Agriculture maintains the demonstration flock of sheep and its dry farming station at Quilchena, B.C.

MOSQUITO AND GOPHER CONTROL DISTRICTS

BY WM. J. BONAVIA, B.S.A., SECRETARY, AGRICULTURAL DEPARTMENT

IN the session of 1919 a statute known as the "Mosquito Control Act" was passed.

The essential features of the Act are that ten or more resident rate-payers in any portion of the province may petition the Lieutenant-Governor in council to establish a "Mosquito Control District." Provision is made for official advertisements, and also for objection to the proposed districts.

If these districts are established within a municipality the Council has power each year by resolution to appropriate funds for the necessary work, the maximum levy not to exceed two mills on the dollar, upon the assessed value of all real property and improvements within the mosquito-control district. If, however, the mosquito-control district is not within the boundaries of a municipality a special Order-in-Council has to be passed fixing the maximum rate of the levy, and authorizing expenditure from the Consolidated Revenue Fund of the province under the direction of the Minister of Public Works for the purpose of mosquito control. Provision is also made for the levying and collection of a special rate not exceeding two mills on the dollar upon the assessed value

of all real property within the district to reimburse the amount expended by the Public Works Department.

The first two districts to be organized are in the Slocan River Valley, close to its junction with the Kootenay River, the headquarters for each being at Appledale and Shoreacres, respectively.

By a clause in the Act the provisions of the same may also be utilized for the extermination or control of the gopher pest, and the Provincial Public Works Department now has the matter in hand.

The destruction and waste amongst field crops and young orchards by gophers in some of the interior valleys of British Columbia has been brought to the attention of the Department for some time past. Individual efforts of farmers have been in almost all cases nullified by depredations of gophers coming from wild or undeveloped lands adjacent to the farms.

It will be very interesting to note the results of the measures adopted in these two first 'control' areas as the lack of co-operation amongst the settlers and the difficulty of effective control have led to the passing of the above Act, through which it is hoped that a solution of these troubles will be found.

NEW CLYDESDALE FOR BRITISH COLUMBIA

AN outstanding Clydesdale stallion, Baron's Best, has been purchased by the University of British Columbia and has arrived at the Colony Farm. Baron's Best is sired by Baron's Pride, one of the greatest sires of the Clydesdale breed. His dam is Rose Leaf, a very choice mare of showyard renown in Scotland. She was by Rosemount, a son of Prince of Albion and Rosemount was a half-brother of Moss Rose, a mare known throughout the Clydesdale world because of her showyard winnings.

Baron's Best holds an enviable record established before he left Scotland. He was imported by Senator Robert Beith, Bowmanville, Ont., and was never shown in America until 1919 when he was champion at Toronto and had a number of offspring winning first and second prizes at the same show.

As soon as the horse stables are completed at the University the university horses now being housed at Colony Farm will be transferred to Point Grey.

DISTRICT FIELD INSPECTOR APPOINTED

A DISTRICT Field Inspector in the Horticultural Branch of the Department of Agriculture at Penticton, B.C., was recently appointed. The new inspector is Mr. Arthur J. Mann, a 1918 graduate of the Ontario Agricultural College, Guelph. Mr. Mann is a well trained horticulturist having spent three seasons in general horticulture under Professor J. W. Crow at the Ontario Agricultural College and one season doing experimental work under Mr. E. F. Palmer at the Vineland Experiment station in addition to his eight years'

practical experience in general agriculture. Mr. Mann was overseas with the Canadian forces and after the signing of the armistice he was engaged by the Canadian Khaki University in England as agricultural lecturer. He served in this capacity for six months. Since his return to Canada he had been working on the home farm near Victoria until his recent appointment. His headquarters are Penticton where he succeeds Mr. W. T. Hunter who has been promoted to Vernon, B.C.

A great many people appear to think that the teaching of agriculture in our schools means the same as teaching "farming", so called. There could be no greater mistake. The misunderstanding lies in the limited conception of what constitutes a good farmer or what is implied in good farming. Agriculture is a science; farming is an art. The successful artist who gets the most out of his work (not merely making money), or puts the most intelligence into the practice of his art, is the one who, other things being equal, applies best the scientific principles underlying his art.—*Rural Education Monthly*.

PART III

Junior Agriculture

DEMONSTRATIONS, COMPETITIONS, AND CLASS-ROOM STUDIES IN RURAL
LIFE FOR BOYS AND GIRLS

CANADIAN BANKERS' COMPETITIONS

ARRANGEMENTS have been completed whereby the Canadian Bankers' Association will again co-operate with the Dominion Department of Agriculture in providing liberal cash prizes for boys and girls under 17 years of age who exhibit pigs or calves at their local fair and comply with the rules governing the competition known under the title of the Canadian Bankers' Competition. As pointed out in the April issue of *THE AGRICULTURAL GAZETTE* the banks and the department have for a number of years co-operated in an effort to encourage the future live stock producers of this country who are being taught the value of type and quality in cattle and hogs. The healthy rivalry prevailing in the prize ring together with the reward for merit makes these competitions deserving of every encouragement and they are worthy of the support of all live stock associations and clubs as well as of the individual producer.

In the light of the world's normal meat requirements Canada is short of supplies especially of beef while our Wiltshire sides are still lacking somewhat in uniformity of quality,

therefore, if full advantage is to be taken of the present opportunity to expand and develop our export trade in live stock and live stock products we must augment our live stock policy and at the same time increase the percentage of export type and quality. The markets to which we have access are exacting and competitive and Canadian products must establish themselves purely on merit.

The competitions will be held at practically all the summer and fall fairs in the Dominion during the summer season. In a district in which there is a school fair or a boys' and girls' club fair the prizes shall be offered at such a fair unless in the opinion of the managers of the banks in the district the prizes should preferably be offered at the agricultural fair. Boys and girls eligible to compete for the prizes offered will do well to enter their animals and thereby materially contribute to the production of a better class of live stock.

The local banks in each districts are in a position to give full information regarding the rules and regulations for the competition.

REASONS FOR TEACHING NATURE STUDY AND AGRICULTURE

FROM RURAL EDUCATION MONTHLY, N.B.

Many reasons have been given for the teaching of agriculture in the elementary schools. The following will set forth the main arguments;

1. To cultivate an interest in country life, to instil a respect for the occupation of agriculture, and to create a due regard for the earth and its products.

2. To create a regard for industry in general and an appreciation of the material side of the affairs of a highly civilized people.

3. To cultivate the active and creative instincts, as distinct from the reflective and receptive that are almost exclusively used in our schools.

4. To cultivate courage under failure and modesty under success, putting to the test early in life the ability to do a definite thing.

5. To train the pupil in ways and methods of acquiring information for himself, and incidentally to acquaint

him with the manner in which information has been originally acquired and the world's stock of knowledge has been accumulated.

6. To connect the school with real life, and to make the value and need of school more apparent.

7. As an avenue of communication between the pupil and the teacher, it being a field in which the pupil will likely have a larger fund of information than the teacher, but in which the training of the teacher can help to more exact knowledge.

QUEBEC

JUNIOR BREEDERS' CLUBS

THE Junior Breeders' Clubs are organized and directed by the Department of Agriculture of Quebec through the medium of its agronomists and with the co-operation of the banks. On the presentation of a promissory note payable three or six months after date, signed by one of the members of these clubs and endorsed by the father or guardian the banks will, if the note is approved, lend a sum not exceeding \$60 at 6 per cent interest. To obtain this special rate the borrower must attach to his note a certificate attesting to membership in the club.

The purpose of these clubs is to kindle the interest of the young people and through them improve our methods of breeding, to familiarize them with commerce and bookkeeping, and to make them understand and love agriculture.

According to the regulations, at least ten young folks between 10 and 18 years of age are required to organize a club. Club members must engage in breeding cattle, swine, or

sheep, and all animals should be pure-bred except swine raised for slaughter. The animals, bought by an officer of the Department and assembled at a central point, are drawn by lot after the price of each has been fixed.

In taking possession of his animal each member should weigh it and register the weight in a special book, afterwards he should weigh and record the weight once every month and keep an account of the feed consumed. All members should present their animals at the exhibition of the Junior Breeders' Clubs, where prizes based on the value of each animal and the bookkeeping done by each member will be awarded. The Department will pay the special subsidy of \$15 for each exposition, to be distributed in seven prizes to the members, and the value of the prizes may be increased by a personal subscription collected, or through, donations from individuals or institutions interested in agriculture.

SCHOOL FAIR WORK AT MACDONALD COLLEGE

DURING the year 1919, the Quebec Department of Agriculture assumed full control of all school fairs for French children, so that Macdonald College rural school department assisted the provincial demonstrators only in the organization of fairs for English children, doing all they possibly could to help make them a success. Assistance was given to all English demonstrators who held fairs. All seeds and eggs, with the exception of sweet corn and potatoes, were provided from Macdonald College, while all bulletins, directions, score cards, forms, and entry systems were also supplied through Macdonald College. In addition, judges were supplied by the college for each fair. The foregoing assistance was provided for seventeen fairs held in nine counties, in each of which counties there was a demonstrator. The rural school department had full charge of eight school fairs in such widely-separated districts as Wolfe and Ottawa counties. Altogether, twenty-five English fairs were held in the Province. The cost of the work is met from the grant made to the College by the provincial Government from *Agricultural Instruction Act* funds.

The total number of children receiving seed last spring in order to take part in these twenty-five school fairs was 5,983. Each child was allowed to take only one kind of material; very simple but definite instructions were supplied, and all seeds and eggs taken by the children were cared for during the summer at their homes. Those in charge believe that these features were responsible for much of the success of the school fairs. Moreover, the plots were regularly visited by most of the demonstrators and prizes were given for those that were best kept. In this way additional interest was created.

The table shows the number of pupils who took the different materials offered:—

	Pupils.
Eggs.....	745
Barley.....	102
Grain Corn.....	227
Oats.....	248
Swedes.....	285
Wheat.....	326
Beans.....	594
Beets.....	549
Flowers.....	857
Potatoes.....	1,078
Sweet Corn.....	543
Tomatoes.....	429

As a rule the pupils took good care of their plots and followed directions fairly well. Many children sow their seed a second year, and special classes have been added to the prize lists in order to encourage the boys and girls to exhibit at the school fair stuff they have grown the second year. By adopting this scheme much has been done towards increasing the amount of good seed throughout the rural districts.

School fairs were held last fall at all the old centres and two new exhibitions were held—at Bishop's Crossing and Inverness. The pupils and parents in these districts showed no small appreciation of the work and did their very best to support the movement.

The school fairs were practically all successful; apart from the interest and enthusiasm of the people, much of this success was due to the thoroughness of the work done in connection with the fairs. Uniformity and simplicity of directions, standardization of agricultural and domestic science competitions, visitation of plots, and the issuing of individual prize lists have all helped in some degree. At every fair the same entry system was used and in this way confusion was avoided and much time saved.

The school fairs were arranged in two circuits and fairs held practically every day. In this way, the same judges worked together during most of the series and became well acquainted with the system followed at each place.

The Quebec Department of Agriculture in October, 1919, decided to take over the operation of all English fairs in counties where they had agricultural demonstrators, so that Macdonald College is only responsible for school fairs where the government has not yet appointed demonstrators. In 1920, all the fairs in regular districts are being re-organized and new fairs are being developed in the districts around Calumet and Arundel, in Argenteuil county, and around Wakefield, in Ottawa county. About 1,000 children will take part in these three new fairs.

LECTURES AND DEMONSTRATIONS

During the year the household science demonstrators continued the good work they have been carrying on for a number of years in connection with school fairs. They gave many demonstrations to rural children in cooking and sewing. It is not intended that credit should be taken for this

work, but it should be pointed out that, as a rule, complete arrangements were made by this department for most of the demonstrations given. Practically all the children in the province who take part in school work have now attended demonstrations along such lines. Last spring demonstrations were given to children in all the schools around Lachute, Bishop's Crossing, Dunham, Freightsburg, Stanbridge East, Cowansville, Cookshire, Bulwer, Island Brook, Sawyerville, and East Clifton, and at many other points in Pontiac, Stanstead, Richmond, Sherbrooke and Huntingdon counties. In so far as was possible, the children of a group of schools were gathered together at convenient points, like those mentioned, and in this way a large number of pupils were benefited. At many of these centres lectures and demonstrations were given to the boys by one of the members of the rural school department.

The results of the work, as shown in the fairs of last fall, prove that both pupils and parents are deeply interested in the projects, appreciating them more fully than is generally realized, and the interest shown is a constant source of inspiration to those engaged in school fair organization.

MANITOBA

COW TESTING

BY H. E. WOOD, B.S.A., IN CHARGE OF BOYS' AND GIRLS' CLUBS

A NEW feature of boys' and girls' club work to be introduced this year for the first time is cow testing. Manitoba is rapidly coming to the front as a mixed farming province and now seems a very opportune time to start this new work. It is well known that in nearly every herd of milking cows there are a number that not only return no profit to their owner but are actually being fed and looked

after at a loss. Testing cows to determine the quantity of milk and butter fat they produce in a year aims at getting after the cows we term "free boarders."

The testing work is to be carried on by club members 12 years of age and over. Each member will undertake to carry on the work of testing two or more cows for the season of 1920. The work will be under the

supervision of the Extension Service in co-operation with the Dominion Dairy Branch and the Provincial Dairy Branch.

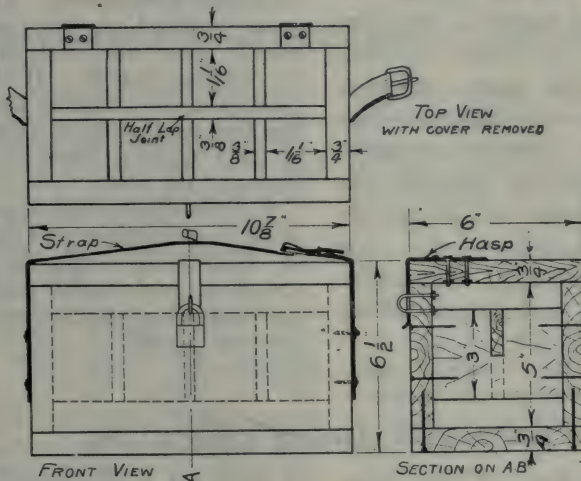
CO-OPERATING

The contracting parties agree to furnish certain parts of the equipment and perform allotted tasks as is shown in the following summary:— The Dominion Dairy Branch furnishes cow testing bulletins, blank record sheets and stationery, preservative tablets, and eleven cents for each test. The Provincial Dairy

charts of two or more cows showing the number of pounds of milk and butter fat produced for the season from the time the cow freshened until the fair is held.

PLAN OF PROCEDURE

Members undertaking cow testing should commence work early in the spring. Although only two animals in the home herd need to be tested it is hoped that the whole herd will be entered. If only two cows are selected the best milker and the poorest should be used for comparison.



BOX FOR TEST BOTTLES

Branch assists in supervising the work. The Extension Service pays 50 per cent of the money paid for prizes for record sheets exhibited at fairs and supervises and assists clubs in every way possible. Each member enrolled in cow testing furnishes a small box to contain sample bottles, a sample bottle for each cow under test, also a spring balance and small sampling dipper. The local boys' and girls' club agrees to provide a Babcock tester or makes arrangements to have the testing done at the local creamery. They furnish necessary pipettes and test bottles. The club also includes a section in its prize list for record

Provision is made for a member residing in a village or town and keeping only one cow to enter this cow.

Three days of each month, the 5th, 15th, and 25th, are selected for sampling the milk. Immediately after milking the cow on the morning of the 5th the pail containing the cow's milk is weighed on the spring balance, the weight of the pail deducted, and the weight of the milk entered upon the record sheet opposite the number assigned to that cow. With the small sampling dipper the milk is thoroughly mixed and a small sample is transferred to a sample

bottle to which is added a preservative tablet. The bottle is then labeled with the cow's number, replaced in the box and kept under lock and key as it is very poisonous. The milk of each cow under test is weighed and sampled in the same manner. The same operation, which takes less than a minute to perform is repeated at the evening milking and likewise twice on the 15th and the 25th of the month.

At the end of the month the box containing a bottle of each cow under test is brought to the centre where the testing is to be done. This may be the school or local creamery. All samples should be tested by the same person in order to secure uniform readings, although every member should understand the different steps of the operation. The percentage of butter fat is entered opposite the weight of milk and the sheets are sent to Ottawa where they are figured up and one copy returned to the member and a duplicate to the tester.

SAMPLE BOTTLE BOXES

The foregoing drawing shows a sample bottle holder for use in connection with cow testing. It can easily be made from pine, spruce, fir, or other suitable material. The box may be made of half-inch wood if preferred, but three-quarter inch stock is better for nailing purposes.

The sides and bottom should be solidly nailed with two and one-half inch finishing nails. One and one-half inch finishing nails will be best for the divisions. Use two and one-half inch steel butts for hinges and fit with a hasp, so that the box can be locked if necessary. Two pieces of strap screwed on the end, so as to buckle near one end, will make a serviceable handle. If desired, two cleats can be nailed or screwed across the top, and a metal handle, such as is used with a door latch, can be fastened on them.

If a six-bottle box is required, the same construction can be used, but the box would simply be shorter. If a twelve-bottle box is required, make the box wide enough to take three rows of bottles.

ABERDEEN ANGUS CALF CLUB

A boys' and girls' Aberdeen Angus calf club has been organized with headquarters at Brandon, Manitoba. A committee to take charge of its affairs consists of John R. Hume, James Turner, and Kenneth McGregor as directors of the Canadian Aberdeen Angus association; Aubrey Weir, the district representative for the Brandon district; W. V. Gordon, manager of the Brandon branch of the Bank of Commerce and the secretary of the Canadian Aberdeen Angus association.

This committee shall approve of rules for the club, pass upon all applications for membership in the club, arrange for financing, purchase and allot the calves to the members

of the club, arrange for prizes for the competition and arrange for a show and sale of the calves at the end of the year.

RULES

1. Any boy or girl over 9 and under 19 years of age shall be eligible for membership in the club.
2. The club shall be an Aberdeen Angus club for the purpose of interesting boys and girls in pure-bred Aberdeen Angus cattle.
3. The club will be financed by the Brandon branch of the Canadian Bank of Commerce, who will accept the boys' or girls' own note for the purchase price of the calf.
4. Group insurance to protect the members and the bank will be arranged by the committee.
5. Cash may be paid if any member wishes to do so.

6. The calves will be heifer calves from 10 to 15 months old.

7. Distribution of the calves will be arranged by the committee about July 1.

8. Calves will be fed as the member wishes, but the club will be ready to give advice and the committee will have the right to see that none of the calves are neglected.

9. Before the show and sale heifers will be bred to a good bull free of charge, the bull to be selected by the committee.

10. The club will continue for one year or until the summer fair of 1921.

11. Prizes will be given and all calves must be shown.

12. All calves must be offered for sale, but each boy or girl will have the right to purchase his or her own calf.

13. The calves will be tested and will be free from tuberculosis.

14. All applications must be signed by the parent or guardian of the boy or girl in question as an assurance to the committee that such parent or guardian approves of the boy or girl becoming a member of the club.

15. The Canadian Aberdeen Angus association will give liberal support to the club.

BRITISH COLUMBIA

ELEMENTARY AGRICULTURAL EDUCATION

FOR the current year the total allotment to agricultural education in the province of British Columbia is \$50,530. Of this sum, sixty per cent is provided from provincial funds, and the balance, \$20,000, from the *Agricultural Instruction Act* grant.

THE AGRICULTURAL GAZETTE is indebted to Mr. J. W. Gibson, Director of Elementary Agricultural Education, for an outline of the policy of the Education Department with respect to the teaching of agriculture in the schools of the province, which is summarized as follows:—

1. Special training for teachers in rural science by means of special summer courses, a preliminary course recognized by the granting of an interim certificate, and a second or more advanced course leading to a diploma in rural science.

2. Special grants to be allowed to teachers holding either the interim certificate, or the diploma in rural science, as well as to other teachers who successfully carry on an approved scheme of work in their schools.

3. Special grants to school boards to meet the extra expenses in connection with rural-science work.

4. Assistance to school boards conditional upon certain expenditures to be made in the general improvement of school grounds, and the establishing of a provincial schools nursery for the propagation of trees, ornamental shrubs, and herbaceous perennials for planting in school grounds.

5. Special grants to school boards and teachers for organizing and maintaining supervised home-gardens in cases where school gardens are not practicable.

6. School and home-gardening work to be supplemented where possible by occasional excursions for the purpose of studying improved methods in gardening, fruit and grain growing, dairying, live stock and poultry-raising, etc.

7. Agriculture to be included as an optional subject in high schools, to be taught in each case by a man especially qualified in agriculture, and having, if possible, approved standing as a teacher.

8. Extension classes in agriculture to be conducted in such high schools by the agricultural specialist for the benefit of the young men of the district who are not regular students in the high school.

9. A general supervision of the work in rural science in the public schools of the district or municipality adjacent to the high school to be exercised by the agricultural instructor in such high schools, and who will be known as District Supervisor of Agricultural Instruction.

10. Incidentally to advise with the people of the district generally regarding such practical problems in farming, gardening, etc., as they may be concerned with.

Under Item 1, a summer school for teachers is held annually for instruction in rural science subjects including nature study, school gardening and general elementary agriculture.

Under Item 2, bonus grants are allowed to teachers who conduct school gardening or school-supervised home gardening. The grants vary in amount from \$30 annually to teachers without special qualifications who successfully conduct this branch of work.

Under Item 3, provision is made for grants to school boards to assist in meeting the cost of school and home gardening. The grants for school gardens comprise (a) Initial grants for the purchase of garden tools and rural science, equipment, and (b) maintenance grants for gardens after the first year. The amount of the grant is determined by the number of rooms in a school and the number of pupils. A minimum area must be maintained. Initial grants range from \$30 to \$100,

and maintenance grants from \$20 to \$75.

Grants for home gardening are the same as maintenance grants for school gardening, provided school fairs are held locally; otherwise only fifty per cent is allowed.

Items 7, 8, and 9, contemplate instruction in agriculture in high schools, together with district supervision of public school work. With this end in view, seven district supervisors of agricultural instruction have already been provided, and it is the intention to increase the number in the immediate future. Their duties are summarized as follows:—

(1) To give a course in agriculture, extending over two years, to students in attendance in high schools;

(2) To assist the public school teachers of adjoining rural districts in carrying out a course of instruction in elementary agriculture and school or home gardening.

(3) To conduct extension continuation classes in agriculture at suitable points in each district during the winter months, open to boys and young men and women not in regular attendance at high school.

Advising with farmers in regard to agricultural problems, indicated in Item 10, is included in the duties of supervisors. This service is arranged in co-operation with the Department of Agriculture, which department, in consideration of such services, provides transportation facilities and office accommodation.

BUSINESS TRAINING IN SCHOOL GARDENING

BY P. H. SHEFFIELD, PRINCIPAL, CHILLIWACK PUBLIC SCHOOL

LAST year the entrance class of the Chilliwack public school wishing to raise money for the purchase of a lantern and slides for regular school use, adopted the plan of growing potatoes on a school garden plot. The space at their disposal was 58 feet long and 48 feet wide besides a narrow strip 4 feet by

68 feet. The strip was used as an experimental for the testing of eleven varieties of potatoes. Besides learning the effect of fertilization and sprays on the yield we were able to classify the crop as early and late. In the autumn the best tubers were selected for seed and the remaining amount of 200 pounds was sold.

The larger plot was devoted to beans, carrots, onions, beets, parsnips, tomatoes, cucumbers, etc., planted in long rows, each pupil being responsible for one or more rows, with co-operative responsibility for paths. In planting our flowers and vegetables we added some varieties with a view to having them for our school fair on September 24th. For instance wheat, parsley, carrot-tops, pumpkins, squash, burning-bush, etc., have a great value as garnishers for exhibits besides their educational value.

Our marketing scheme was perhaps unique. Each pupil wrote on a sheet, with printed letter-head, a letter addressed to "Mr. Progressive Grocer, at Some Town, Alberta" calling his attention to the cucumbers and green tomatoes we could sell in season and quoting prices for the various articles named. The letters mailed in June, were signed: "Chilliwack Public School, Garden Dept., per A. Student."

Replies were on hand when school opened in September enclosing money-orders. Then began the interesting work of harvesting and selecting vegetables, making crates, packing, addressing and shipping the pro-

duce—all done by the pupils. The exercises in weights, measures, Canadian money, making of bills, shipping bills and bank statements were much more real and vivid when we were working with tangible things. I consider the effect of this work in composition, arithmetic and geography, was just as important as the nature-study part of it.

In September, too, the work of selecting the most perfect exhibits for the school fair was done by the pupils themselves.

The arrangement of backgrounds and colour schemes by pupils for school fairs was just as conducive to art appreciation as the contemplation of "red-breasted blackbirds on sunlit lawns." Many of our drawing periods in these classes were used in learning to draw objects taken from our school gardens, say a carrot for a cone or an onion for a sphere.

Finally our pupils, from a total space for all departments of 99 x 152 feet, produced vegetables enough to net them over \$100. They won the trophy at the local fair, helped the other Chilliwack schools to win the provincial shield at New Westminster, purchased their lantern, and had a bank balance of \$95.84.

Where school supervised gardening has been introduced as a continuation school activity the child has an objective at the close of the daily session. Whether the garden be on the school grounds, vacant lot or in the home backyard there is an eager interest to see what nature has unfolded during the day. There are plants to cultivate and weeds to pull that utilize muscular energy. There are flowers and fruits, and insects to satisfy the demands of sense development. There are definite occupations to employ the interests.—Nature Study Review.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications, and Notes

AIM AND VALUE OF YOUTHFUL CLUB WORK

BY E. T. MEREDITH, SECRETARY OF AGRICULTURE FOR UNITED STATES

BOYS' and girls' club work is one of the important features of the agricultural extension work conducted by the States Relations Service, United States Department of Agriculture, in co-operation with the State agricultural colleges and local agencies for the purpose of improving agricultural conditions and practices throughout the country. These clubs are organized to improve farm and home practices by instructing the boys in correct agricultural methods and the girls in home making; to assist them in demonstrating these methods for the improvement of the farm and home; to aid in the development of co-operation in the family and in the community; to create a more favourable attitude toward the business of farming and home making by encouraging property ownership and the feeling of partnership; and to make rural life more attractive by providing organization which tends to diminish isolation and develop leadership.

These objects are in process of attainment. Wherever club work has been pushed by our agents, larger yields have been obtained, better pigs have been raised and finer cattle, both dairy and beef, have been grown. The motto of the club is "To Make the Best Better". Registered animals are now common where only a few years ago they were unknown, and there is a systematic effort to cull out scrub live stock and poultry. Large yields of crops have been made by club members on lands which were considered worthless, and little girls are vying with the best packers in canning and

preserving fruits and vegetables, and are becoming a potent factor in helping to make the farm home more attractive and enjoyable.

The average yield per acre made by club members in the growing of field crops is two to three times as large as the average yields made in the States in which the members are located. Many people, seeing a boy or girl here and there engaged in club work, do not realize the value of the products by these young folks in the aggregate. In 1918, while under the stress of war and responding to an appeal made to club members in the furrows "over here" to help feed the boys in the trenches "over there", the records in the office show that these young people produced food and feed to the value of more than \$20,000,000.

The money value of the products of club members is only a small part of the value of club work. Many boys and girls have had their vision of life enlarged by club membership. Many have taken and are taking college training. The agricultural colleges of the country especially have profited in enrolment from the clubs. Many boys and girls have made their own money to defray their college expenses in club activities. Many after graduation have returned to the farms or have engaged in extension work as county agents. Rural life has been greatly enriched in recent years by the trained leadership obtained from agricultural clubs. The results obtained in this work justify many times the expenditures made in securing them and appeal strongly for a larger development of this very useful work.

BETTER THAN BOOK FARMING

TEACHING agriculture from a text book is a remnant of the earlier method in the development of agricultural education, as tried in the public schools. In Ontario, between the years 1845 and 1898, four different text books were used. At present there is no prescribed text book in agriculture in that province. Not that the printed word as a means of enlightening the mind is ignored. But for young pupils in elementary schools, the primer in agriculture is the book that lies open in every country child's every day observation and experience. The book is the Book of Nature as found in the farm. The teacher of agriculture directs the learner to that book, and helps him to read it. He learns from his teacher just as a farm child in a good home, with an intelligent father and mother, learns

lessens in agriculture and in life every day. It is a natural method of teaching and learning agriculture. It awakens an interest, it trains the powers of observation, it leads to inquiries and experiments; and the trained teacher, who is the chief guide in the intellectual development of the child uses these interests, these inquiries, these experiments as the solid ground-work for her building. She goes further in teaching agriculture than any home can.

The pupil seeks the help of books, but he is not primarily dependent on books. There is created in him a taste for reading, and his reading is directed intelligently. But the method doesn't make "book farmers"; it makes interested intelligent reading farmers. Moreover, the book is not discarded, but given a place of honour; every country school should have its agricultural book-shelf.

VALUE OF DEHORNING CATTLE

IT is estimated that about one-quarter of a million dollars is annually lost by Canadian farmers through neglecting the practice of dehorning their cattle.

Live stock exchanges in Winnipeg, Toronto, and Montreal especially encourage dehorning and practically all American native cattle, with which Canadian farmers in the west have to compete, have the advantage of being thus treated, there being a large return in dollars and cents. In a circular issued by the federal government it is pointed out that farmers will benefit in the following ways by de-horning their animals.—First, better appearance of cattle; second, quiet, subdued nature of cattle enabling fattening at less cost, and third, more cattle can be shipped in one car by rail saving freight cost.

It is when the animal is finally brought to the slaughter that the value of dehorning is proved. Over 70,000 pounds of meat a year are actually reported at inspected Canadian packing plants as wasted through bruises in the flesh. Most of the

bruises are caused by the animals' horns while in transit from the farm to the market and abattoir. That total represents the parts of meat utterly thrown away. There is a further and even greater loss.

When a piece of meat is removed from a quarter of beef because of a bruise the rest of the quarter or part of it often has to be sold at one or two cents less per pound; not because the meat is poor but because that part has lost in appearance and sale value.

Probably one in every five cattle bought at Canadian stock yards suffers from injury which could be prevented were dehorning commonly practised. The packer's buyer necessarily takes the loss into account and the farmer who sells cattle takes the risk and lower price.

A united effort is now being made by the federal and provincial Departments of Agriculture, the live stock exchanges throughout Canada, and the meat packers collectively, to get a better knowledge diffused among Canadian farmers of the real importance of dehorning.

ASSOCIATIONS AND SOCIETIES

CANADIAN GOAT BREEDERS' ASSOCIATION

At the annual meeting of the Canadian Goat Breeders' Association held in the office of the Vancouver Exhibition Association, it was decided that Canadian goat breeders will uphold the Dominion regulations in regard to legislation and will breed their stock to established type. There had been some talk of the Canadian pure bred type but owing to the insistence of the federal Department of Agriculture goats will be bred according to established type. In connection with the meeting of the Canadian

Goat Breeders' Association a meeting of the British Columbia Association was held at which arrangements were made for representation by goat breeders at the fall fairs of the province. British Columbia has over 300 persons interested in goat breeding and during the year the elimination of scrub stock has been steadily pursued. Officers of the Canadian association for the year are:—President, A. French; vice-president, L. H. Baldwin, Toronto; secretary-treasurer, Geo. Pilmer, Department of Agriculture, Victoria. B.C.

CANADIAN CO-OPERATIVE WOOL GROWERS' ASSOCIATION

Several men prominent in provincial agricultural affairs have been secured by the Canadian Co-operative Wool Growers' Association, Limited, and are now conducting the affairs of this association in several of the provinces. Professor W. H. J. Tisdale of the Animal Husbandry Department of the University of Saskatchewan has accepted a position with the association at Toronto, Ont. Professor Tisdale is well known in Ontario having been raised on a farm near Paris, Ont., and being a graduate of the Ontario Agricultural College with the class of 1913. After graduating he was for a while Agricultural Representative for Peel county before joining the staff of the Saskatchewan University.

Mr. W. W. Thomson, formerly Director of the co-operative organization work in Saskatchewan Department of Agriculture, Regina, has joined the staff of the Canadian Co-operative Wool Growers' and is now engaged in this work in the province of

Manitoba and Saskatchewan. Mr. Thomson is well known to the live stock men in the prairie provinces.

In the province of Quebec Mr. L. V. Parent, formerly Agricultural Representative at Richmond, will be in charge of the work. A new warehouse at Lennoxville, Que., is nearing completion and will shortly be used as a central grading point for the Quebec wool.

At the Weston warehouse the construction of the third floor for grading is under way and when the season opens it is expected that the western wools will be centralized at this point. Ontario wool will be centralized at Guelph and Quebec wool at Lennoxville. In the Maritime Provinces, New Brunswick has one grading station at Fredericton; Prince Edward Island has one at Charlottetown; and in Nova Scotia there are two or three stations this year but it is planned to have only one central grading station in Nova Scotia next year.

POTATO GROWERS' ASSOCIATION OF PRINCE EDWARD ISLAND

A Potato Growers' Association for Prince Edward Island has been organized for the purpose of promoting the interests of the potato industry in the province. The association will assist in the dissemination of knowledge of the methods of eradicating and controlling insect and fungous enemies and the standardizing and marketing of the crop. It is proposed to organize branch societies in isolated districts. The advisory board of the society will include the Director of the Dominion Experimental Farms, the

Dominion Botanist, Dominion Horticulturist, the superintendent of the Dominion Experimental Farms within the area, the Secretary of Agriculture for Prince Edward Island, the provincial horticulturist and nine directors of the association elected by ballot at the annual convention. The following officers were elected: President, A. E. DeWar; vice-presidents, John McFadyen, Cape Traverse; B. F. MacDonald, Montague. secretary, Wilfred Boulter, Charlottetown

PRINCE EDWARD ISLAND LIVE STOCK BREEDERS' ASSOCIATION

At the annual meeting of the Prince Edward Island Live Stock Breeders' Association held at Charlottetown on April 13, a resolution was passed favouring an enrolment tax of five dollars for all bulls over one year. The question of a general test for tuberculosis throughout the province was favourably considered and it was re-

commended that the provincial Government bear the expense of the veterinaries' fees in connection therewith. The following officers were elected: President, Fred McRae, Royalty; vice-president, C. E. MacKenzie, Milton; secretary, W. W. Gibson, Marshfield.

PRINCE EDWARD ISLAND AYRSHIRE BREEDERS' ASSOCIATION

The first annual meeting of the Prince Edward Island Ayrshire Breeders' Association was held at Charlottetown on April 7th. A resolution was passed approving the establishment of the accredited herd system by the federal Department of Agri-

culture; urging the breeders in the province to take advantage of it, and recommending the provincial Government to admit only cattle that have passed the test and that imported cattle be kept in quarantine until retested for tuberculosis.

NEW BRUNSWICK FRUIT GROWERS' ASSOCIATION

In his report at the fifteenth annual meeting of the New Brunswick Fruit Growers' Association the secretary-treasurer pointed out that the membership this year totals 174 as compared with 128 in 1918. The association is continuing the work of supplying its members with nursery stock, spraying materials, and all kinds of supplies and the volume of the business for 1919 shows an increase of 35 per cent for the previous year.

The association was incorporated under the special charter of the New Brunswick legislature last year and an annual grant of \$200 was appropriated for the association.

A summer field meeting was arranged for last year and on August 28 the first field

day of the association was held. Members of the association spent the day in visiting various orchards, where demonstrations in grading and barrel packing were given by Government officials, who also explained the requirements of the "Fruit Marks Act" and generally assisted in making the day one of educational value to the members. About one hundred fruit growers and their friends profited by the day.

The apple situation in a number of the provinces of Canada is rather serious, and New Brunswick fruit growers are well advised in putting forth every effort to encourage and stimulate the apple industry during the next few years.

ALBERTA WOMEN'S INSTITUTES

At the sixth annual convention of the Alberta Women's Institutes held in Edmonton it was shown that during the past year there was an increase of 32 new institutes making a total of 265 with a membership of 13,150. It is the largest women's organization in Alberta to-day. The convention was an intensive one in that the work of the institutes through the constituency conveners was given in detail and from these details the delegates gleaned hints and inspirations to take back to their own communities and push onward in every part of the province.

The predominant feature of the convention was its music; real substantial music was emphasized and ably demonstrated. A spirit of unanimity was shown in the election of the provincial advisory board, each officer being returned unanimously.

In reviewing the work of the past year Miss Mary McIsaac showed the aggressive campaign of institute work during the year.

Twenty-one thousand women attended short courses given under the auspices of the Alberta women's institutes. Home nursing and aid has been given at 54 centres, sewing at 22 centres, cookery and food values at 16 centres. One hundred and twenty-eight institutes were visited by the institute speakers, and 19 constituency conferences were held; these being particularly helpful in developing leadership and community work in each constituency. An important feature of 1919 was the campaign for the proper feeding of children, this being carried out by food exhibits at Edmonton and Calgary fairs. This was followed by the distribution of 30,000 bulletins and menus for children between the ages of 1 to 7 years. Twenty-three thousand people in the drought areas have been helped and nearly 30,000 articles of second hand clothing and \$6,000 worth of new clothing have been dispensed. Two institutes have awarded scholarships to two

girls enabling them to attend one of the agricultural schools of Alberta. There are 36 women's institute rest rooms in the province and of this number approximately one-third own their own buildings. A number of these have been built as memorial halls to the heroes of the great war.

The women's institute girls' clubs, provided for in an amendment to the Women's Institute Act at the 1919 session of the Alberta legislature, now number 40 with a membership of 840 girls. One whole day of the convention was given to girls' club work and the girl delegates elected their provincial advisory board at the close of that day.

A number of important resolutions were passed. The convention endorsed unanimously a higher minimum wage for girls raising it from \$9 a week, which is set by the

Factory Act, to \$15 per week; also that a free correspondence course on food values be given to mothers by the Department of Agriculture. Considerable discussion centred around three resolutions having to do with education. Further resolutions carried were that disapproval be voiced against performing animals because of cruelty in their training; that the age of consent be raised from 14 to 21 years, and that teachers be asked to teach and explain a code of laws regarding the meaning and abuse of the flag. Another point brought out at the convention was that institutes, according to their constitution, are allowed to discuss political questions but not from a party politics standpoint. The meaning of the word politics "measures to promote the welfare of the state" is entirely within the constitution.

NEW PUBLICATIONS

DOMINION

The Principal Poisonous Plants of Canada Experimental Farms, Bulletin No. 39, Second Series, by Miss Faith Fyles, is profusely illustrated and gives careful descriptions of various poisonous plants of economic importance to farmers and stock men.

Wild Rice Bulletin No. 42, Second Series, Dominion Experimental Farms, is prepared by Miss Faith Fyles, B.A., Assistant Botanist. Its main object is to stimulate the growth of wild rice in suitable localities in order to attract and furnish food for wild fowl.

Locusts Control in the Prairie Provinces, Circular No. 13, by Norman Criddle, Entomologist in charge for Manitoba, has been prepared to supply to farmers in the infested regions of the Prairie Provinces the necessary information concerning the habits of the troublesome locusts and methods of prevention and control.

Crop Protection Leaflet No. 11 by E. H. Strickland gives the dates on which it is safe to reseed fields in the Prairie Provinces after they have been devastated by cut worms.

Boring Caterpillars Affecting Corn and Other Crops and which are Liable to be mistaken for the European Corn Borer, Circular No. 14, is by Arthur Gibson, Acting Dominion Entomologist. This circular has been prepared for the purpose of enabling agricultural workers and others to distinguish between the various species of caterpillars found boring in corn and other crops.

NOVA SCOTIA

Annual Report of the Secretary for Agriculture of Nova Scotia for the year 1919 contains

a statement of the work done during the year under the provisions of the Act for the Encouragement of Agriculture. It includes reports of the secretary for agriculture, principal of the College of Agriculture and the various heads of branches in Part I, and in Part II agricultural societies, associations, exhibitions, et cetera, are included.

NEW BRUNSWICK

Annual Report of the Department of Agriculture of the Province of New Brunswick for the year ending October 31, 1919, includes a review of the work of the agricultural department and a concise report from the heads of each division, giving an outline of the work carried on under their direction.

QUEBEC

Beekeepers' Association of the Province of Quebec is a French report of the activities of apiculture associations in the province during 1919. It shows considerable information of value to beekeepers in this province.

Circular No. 3, The Setting Hen and Her Chicks published in both French and English gives information regarding the selection of the hen, placing of the nest, care and feeding of hen and chicks and other helpful hints for the use of poultrymen.

A number of circulars covering the more important field crops grown in Quebec have been issued by Professor Chas A. Fontaine, B.A., B.S.A., of the Oka Agricultural Institute. These circulars give complete information as to the varieties, place in rotation, seeding, harvesting, yields, etc., for each crop dealt with. They are as follows: Circular No. 28,

wheat; No. 29, rye; No. 30, barley; No. 31, oats; No. 32, flax; No. 34, corn; No. 35, peas; No. 36, beans, and No. 37, potatoes. These circulars are concise and well written and give valuable information regarding these important crops in Quebec province.

Bulletin No. 25, A Summary Study of Cereals by F. N. Savoie, B.S.A., gives the botanical characteristics of the various cereal plants of practical importance. It gives a clear idea of the way plants grow when properly supplied with sunshine, air, moisture, and fertile ground.

Canadian Farm Poultry. This is a new book written by M. A. Jull, M.Sc., Macdonald College, Que. It gives complete information regarding poultry raising and is full of illustrations bearing on matters discussed.

ONTARIO

The Forty-first Annual Report of the Agricultural Experimental Union, 1919. In this report the work of the Experimental Union for the year 1919 is reviewed and the addresses at the annual meeting held in January, 1920, are contained in full.

MISCELLANEOUS

Canadian Society for the Protection of Birds Report for 1918 and 1919 outlines the purpose

of the society and its achievements since its organization in 1914.

Directory of Poultry Breeders in British Columbia. This directory contains a list of the poultry breeders in British Columbia together with a list of winners at the provincial show held in Vancouver, January, 1920. It is Bulletin No. 9 of the British Columbia Poultry Association.

BRITISH COLUMBIA

Report of the Director of Elementary Agricultural Education for the province of British Columbia. This report, which is a reprint from the Public School Report, 1918-19, contains much valuable information regarding the agricultural education in rural schools of British Columbia.

The Forty-Ninth Annual Report of Public Schools of British Columbia, 1918-19. This report with appendices contains information relative to the educational work in British Columbia and a part is devoted to the agricultural education in rural schools of the province.

Pruning Fruit Trees. Circular No. 60, New Horticultural Series. This circular on the pruning of apple trees gives complete instructions for the proper care of fruit trees from seedling to the mature tree.

NOTES

At the annual bull sale held at Edmonton this spring thirty-one Herefords, including calves from ten to eighteen months old brought an average price of \$245 per head.

The Alberta Live Stock Association has sold 6,087 bulls for \$1,111,865. The average value in 1920 is \$287.85 as compared with \$225.26 for 1919.

Twenty-eight students have this spring graduated from the Nova Scotia Agricultural College, securing their associate diplomas in agriculture.

The representative of THE AGRICULTURAL GAZETTE recently appointed for the province of New Brunswick is Mr. O. C. Hicks, Superintendent of Soils and Crops Division, Department of Agriculture.

By legislation recently introduced in the Ontario legislature, the Western Ontario Seed Growers' Association and the Eastern Ontario Seed Growers' Association are combined.

The employment of negro county agents in Virginia has been highly praised in that state by the co-operative education extension workers who met in conference at Hampton, Virginia.

A short course in country elevator book-keeping for men interested in elevator management was given at the University of Missouri, College of Agriculture, Columbia, during the last week in May.

Of the 430 Mississippi club boys who attended the junior farmer mechanics short course at the Mississippi Agricultural and Mechanical College 402 expect to go to college when they are finished high school.

About ten thousand acres of surrendered Doukhobor lands in the vicinity of Kamsack, Sask., were disposed of by ballot to soldier settlers under the federal Soldier Settlement Board regulations.

Premier Fashion, new Clydesdale stallion, three years old and of magnificent build, has recently arrived at the Nova Scotia Agricultural College, Truro. He is well bred, being closely related to the famous Baron's Pride.

A new Holstein bull has been added to the college herd at Truro, N.S. He is fifteen months old and a finely developed animal. His dam, Trenton Keyes Hermes, No. 46203, has a seven day record as a three year old of 573 pounds milk and 30.09 pounds butter.

Under the supervision of Dr. MacIntosh the sophomore class of the Ontario Veterinary College, Toronto, spent two weeks at the Ontario Agricultural College, Guelph, during the winter term for the purpose of receiving practical instruction in animal husbandry.

The provincial Department of Agriculture has induced the railway companies to quote a special rate of \$10 per ton on hay from Montreal to any point in Saskatchewan, provided the feed is purchased by *bona fide* farmers through the municipal authorities.

In the amendments to the Soldier Settlement Act adopted by the House of Commons at Ottawa is a clause declaring that nurses who were resident in Canada before the war and who served overseas shall be eligible to qualify for land settlement.

In anticipation of a possible outbreak of grasshoppers in the province of Manitoba, school children in the districts threatened are being taught to identify the grasshoppers of the different varieties and to recognize evidences of their appearance in threatening numbers.

Five new agricultural districts have been created in the province of Quebec for the advancement and further development of modern farming. These districts are supplied with agricultural experts who give advice on all branches of the industry and encourage up-to-date farming methods.

The Manitoba Department of Agriculture has purchased about 400 tons of hay in North Dakota and is now moving it into Manitoba. Twenty tons of this are slough hay, thirty tons are western rye grass, and the balance is good upland hay. It will all be disposed of at cost, which will be from \$25 to \$35, including freight and exchange.

Ten students completed the course in factory dairying given at the Manitoba Agricultural College from January 19th to March 31st. Besides passing the examinations in connection with the course the students, in order to secure dairy school diplomas, are required to give at least one season's satisfactory service in a creamery, cheese factory, or milk plant.

The United States Department of Agriculture, upon application from teachers of vocational agriculture, supplies prints of approved photographs of the different breeds and types of horses, cattle, hogs, sheep, and poultry. It is believed that the disposal of such pictures on school room walls will encourage the keeping of well bred stock in the locality.

The province of Quebec Society for the Protection of Birds as an activity has arranged a series of Field Days that will be continued from week to week into groves, fields and by-places where birds and other forms of nature can be observed. Weekly outing days are announced well up into June. The secretary of the society is Mrs E. L. Dyer, 12 Willow Avenue, Westmount

A tablet in the form of a cross bearing the names of the members of the faculty and students who gave their lives in the great war was unveiled in the assembly hall of the Ontario Veterinary College about the end of the last term. The Hon. S. F. Tolmie, Federal Minister of Agriculture, was the speaker on the occasion and Hon. Manning Doherty, Minister of Agriculture for Ontario, presided.

The Ontario Department of Agriculture is offering four prizes at the Canadian National Exhibition next year to the value of \$600 to demonstrate the superiority of the pure-bred sire in stock raising. The first of these prizes is in the dairy cattle class where prizes are offered for the best calf, yearling and two-year-old sired by a pure-bred bull; the cow may be any grade or scrub. Similar awards are offered in the beef class.

The latest development of the Vermilion Agricultural Society is the inauguration of an annual ploughing match the first of which will be held on June 16. Its object is to inculcate an ambition to plough properly and to develop a spirit of pride. Better ploughing means better crops and annual competitions have had a material effect in

vastly improved working of the land besides setting up a standard which the young ploughman endeavours to attain.

At a meeting of the A.V.M.A., of which the Ontario Veterinary College is now an accredited member, it was decided to raise the requirements for entrance to a veterinary college to four years high school preparation. Out of ninety-eight students who made application for entrance to the O.V.C. last October only thirty-three were able to comply with the stringent regulations enforced by the college as a recognized institute of the A.V.M.A.

Mr. W. W. Thomson, Director of Co-operative Organizations in the Department of Agriculture of Saskatchewan, has resigned to accept the management for Manitoba and Saskatchewan of the Canadian Co-operative Wool Growers, Limited. Wool receiving warehouses will be established at Portage la Prairie, Manitoba, and at Regina, Saskatchewan. Wool sacks, paper, twine, and other supplies will be sent from these points and shipments of wool be received. Mr. Thomson's headquarters will be Regina.

The Iowa State Board for Vocational Education is carrying on in four counties part-time dull season short courses in agriculture. There are 19 centres of instruction located in each of these four counties. These classes are open to persons of any age above 14 engaged in farming and unable to attend a day vocational agricultural class. The schools are in session five days per week for a period of ten weeks. The courses are

adapted to meet the local conditions and the special needs of the members of the class.

In the Chicago stock yards there is a school which in many respects is unique among institutions of learning. This is the continuation school maintained by a packing company in collaboration with the Chicago Board of Education for its office boys and girls. The 300 or more boys and girls in daily attendance are, naturally, the type which must leave school early in order to make a living. About 60 per cent of these young people are under 16 years old. The relatively small number who have not completed the eighth grade are given an opportunity to obtain the minimum essentials of a grammar school education. The others are given work of high school grade.

The first systematic effort made by any college faculty to consider the question of method of teaching in their own classes was made at the Pennsylvania State College this year, when the instructing staff in agriculture took ten lessons on methods in college teaching from Professor Wm. H. Kilpatrick. The members of the staff of the College of Agriculture developed their interest in better teaching methods largely from three sources: (1) from problems that have arisen as a result of changes made in certain courses to meet war-time requirements; (2) from an attempt to build a new curriculum for the school of agriculture, and (3) from the efforts on the part of the institution to send out into the secondary schools teachers of vocational agriculture who know something of the problem of teaching as well as the fundamental principles underlying good farming.

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Rural Canada, Toronto, Ont.

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Problem of Farm Management. Dr. C. A. Zavitz, page 27.

The young man who purposes to start farming should first secure an education. Education is much more essential in farming than it was twenty-five years ago. It will certainly be more essential in the future than it is today. A young man who is getting ready to start farming is not preparing for today only; he is preparing for forty years from now. . . . Of course education does not insure success. Some men succeed without it and some fail with it but the chances of success are much better with a good education.—G. F. Warren, Ph.D., Cornell University.

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty, International Institute Commissioner, Department of Agriculture, West Block, Ottawa.

GENERAL INFORMATION

552—Agricultural Conditions in Mesopotamia.—*Indian Engineering*, Vol. LXV, No. 2, p. 19, Calcutta, Jan. 11, 1919.

Mesopotamia with its arid climate and its two rivers is an ideal country for irrigation operations. The general character of the soils in the valleys of both the Tigris and Euphrates is that of a light calcareous loam; and where there are noxious salts there should be no difficulty in reclamation, provided that the supply of water is plentiful. Success in washing out the soluble salts in Egypt was attained under less favourable conditions. Nitrogen is said to be about as high as in the average soils of Egypt. Potash is present in more than the average amount, and phosphoric acid is found in sufficient quantities for the growth of ordinary crops without the application of manures. There are moreover rich porous clays and alluvial soils in the lowlands through which the rivers run.

In the winter months, from November to May, the cereal crops, wheat and barley, succeed admirably. The pulses should also do well and winter forage would present no difficulties. There is no doubt about maize and the millets, and summer forage of certain kinds. Rice can be cultivated with success as is known by experience, sugar cane on the richer soils, and there is no reason why cotton, possibly Egyptian cotton, should not form a large item of the cultivated area. Garden produce, vegetables and certain fruits, should also do excellently. Oranges and melons are already grown, grapes would probably succeed, and the climate is suitable for dates.

555.—The Harm in Using Boric Acid for Preserving Food.—LINDET, in the *Comptes rendus des Séances de l'Académie d'Agriculture de France*, Vol. V, No. 10, pp. 345-347. Paris, March 12, 1919.

The use of boric acid for the preservation of food, permitted for butter in England, was expressly forbidden in France. It was authorized in 1916, as an exceptional and

provisory measure, for butter and margarine (at the rate of 5%) and for ham and pork by-products.

Boron is contained naturally in food, but the quantity ingested daily by each person is not more than 0.030 gm. If the 50 or 75 gm. of butter or margarine used each day contains 5 per 1,000 of boric acid, if the 100 gm. of pastry that may be eaten each day is mixed with 15% of egg yolks containing 2 or 2.5%, if the ham contains boric acid, etc., the average ration is considerably exceeded, reaching about 0.5 gm.

The author asked M. Kohn-Abrest, Director of the Toxicological Laboratory of the Prefecture of Police, and M. Alquier, general secretary of the Society for Alimentary Hygiene, to furnish him with their bibliography on the subject. This shows that the ingestion of boric acid in heavy doses produces a decrease in weight of man and animals, and particularly a loss of fat, hinders nitrogen exchange and deranges the proper utilization of the food by increasing the peristalsis of the intestine, thus leading to diarrhoea. The organism only excretes 85% of the boric acid ingested, including 81-82% in the urine, 1% in the faeces and 3% in the perspiration; 15% is, therefore, retained and an accumulation of boric acid like that often observed with poisons, is to be feared, allowing for the difference between them. Such an accumulation is to be feared especially with persons whose kidneys act badly.

For these reasons, the author demands that the provisory authorization to add boric acid to food should be withdrawn as soon as circumstances allow.

556.—The Use of Passive Anaphylaxis for the Detection of Tuberculous Meat.—

GRANUCCI, L., in the *Clinica Veterinaria* Year 42, No. 4, pp. 115-126.—Milan, February, 28, 1919.

Work carried out at the Institute of Hygiene of the Royal Veterinary School at Naples. The author briefly considers previous work on anaphylaxis and the use several workers have made of it for the diagnosis of tuberculosis, divergent results

CROPS AND CULTIVATION

being obtained. Thus, Dr. Sparapani recently used solutions of muscle juice obtained by macerating for 12 hours, then filtering, and inoculated them into the peritoneum of the rabbit in doses of 1 to 2 cc. After 24 hours he inoculated bovine tuberculin in solutions of 10-2-1% in the peritoneum or in the veins, at the rate of 1/100 to 1/1000 of a cc. for each of them. He states that the results he has obtained both for cases of advanced and medium stages of tuberculosis, enable him to draw the conclusion that anaphylaxis is a valuable diagnostic method for meat inspection.

The author has used Dr. Sparapani's method, but he made the injection with a much stronger dose of tuberculin. Moreover, in order to study the transmission of transport of passive anaphylaxis to one of the sensitive rabbits, he bled one after 13 days, defibrinated the blood and inoculated its aseptic serum in 2 cc. doses into other normal rabbits, to which he gave, after 24 hours, a second injection with the meat extract previously used for sensitizing. Thus he carried out 2 series of experiments:— (1) sensitization of rabbits with tubercular (bacillary) protein and determination of an anaphylactic state by test injections with a basis of bacillary protein; (2) sensitization as above, passive transmission of the allergia to other normal rabbits, and determination in them of anaphylaxis by means of albuminous protein. From the results given in detail in two tables, the author draws the following conclusions:—

(1) The muscle plasma of cattle suffering from tuberculosis to an advanced, or even medium, degree, injected once into rabbits, produces a hypersensitive state in them, so that a subsequent injection of tuberculin causes a severe form of a state of passive anaphylaxis.

(2) This reaction can be considered as specific, for control rabbits, inoculated with plasma from healthy cattle, either do not react or show very slight disturbances which are of no importance, because they are not comparable to a true state of anaphylaxis even in a slight form.

(3) The condition of anaphylaxis can be transported to other healthy rabbits, but the morbid form obtained is less intense if albuminous protein is used instead of bacillary protein.

(4) In the two cases of passive anaphylaxis, there is always a rise in temperature.

(5) Examination for anaphylactic antibodies in meat from cattle suffering from tuberculosis to an incompletely limited and circumscribed degree may be extremely useful for meat inspection, when the meat has to be examined in the absence of the viscera and when the great ganglia of the quarters are not affected or if the suspected meat is already cut up.

559.—General Classification of Climates by Temperature, Precipitation, and the Character of the Seasons.—KOPPEN, W., in *Petermann's Mitteilungen*, Year LXIV, Pt. Sept.-Oct., pp. 193-203; Pt. Nov.-Dec., pp. 243-248. Gotha, 1918.

This paper gives a detailed study of the classification, and their distribution. This distribution is illustrated by a coloured map. The author bases his classification on two meteorological factors only—temperature and precipitation—and takes into account both their absolute values and their distribution throughout the year. He distinguishes eleven principal types of climate, designated on the map by letters and different colours, a few secondary, or transition types, numerous sub-types, designated by letters or groups of letters.

The author also studies the schematic representation of the distribution of climates over the world, prehistoric climates, relation between climate and soil, and influence of climate on cultivation.

562.—Soil Acidity as Affected by Moisture Conditions of the Soil.—CONNER, S. D., in the *Journal of Agricultural Research*, Vol. XV, No. 6, pp. 321-329. Washington, November 11, 1918.

It has previously been shown that drained soil is less acid than undrained soil. To throw more light on this subject the author studied five typical Indiana soils under controlled moisture conditions. The soils studied were:—(1) a yellow silty clay; (2) a whitish silt loam; (3) a brown silt loam; (4) a black peaty sand; (5) a dark brown peat. The experiments lasted one year and were made with pots. At the end the acidity was found to vary with the different moisture contents. Soils rich in organic matter were most acid when completely saturated, whereas soils poor in organic matter were most acid when half saturated. Potassium nitrate extracts of fully saturated soils contained more iron in the ferrous forms than less saturated soils.

Fully saturated mineral soils had a higher content in soluble manganese but a lower content in soluble aluminium than other soils.

The measurable acidity of acid soils depends largely on the different conditions of moisture and aeration. The variations are due to chemical rather than physical changes in the soil.

The acidity of damp soils is due to leaching of the strong bases, removal of the bases in crops, the decay of carbonaceous and nitrogenous substances, and the hydrolysis of the mineral compounds and organic matter.

563—The Solubility of the Soil Potash in Various Salt Solutions.—TRETSSER, E. K., in *Soil Science*, Vol. VI, No. 3, pp. 237-257. Baltimore, September, 1918.

Text books contain much contradictory and unreliable information on the power of sodium, calcium, and magnesium to replace potassium in soil and to make it available for plants. The author made a series of experiments on the liberation of potash from the soil by salt solutions in different types of loam, sandy loam, silt loam, and humus loam soils.

He found that calcium sulphate increases the solubility of potash in some soils. This action is much more marked on sandy parts of the soils, and explains why only some soils benefit by the application of gypsum. Bi-calcium phosphate and tri-calcium phosphate have very little effect on the solubility of potash in soil, and mono-calcium phosphate seems even to decrease this solubility. It would appear, therefore, that any effect superphosphate has in making soluble the potash in soil is due to the calcium sulphate it contains.

Carbon dioxide and calcium carbonate solutions increase the solubility of potash in silt loam. Sodium salts are sufficiently active to dissolve potash in soils, and the action of sodium chloride increases with its concentration in the soil solution. The fact that beets require sodium for complete growth may explain the beneficial action of salt on certain crops.

564—Soil Factors Affecting the Toxicity of Alkali.—HARRIS, F. S., and PITTMAN, D. W., in the *Journal of Agricultural Research*, Vol. XV, No. 5, pp. 287-319. Washington, November 1, 1918.

The aim of the investigations described was to determine as exactly as possible the quantity of the various salts necessary to crops in arid soils. Over 12,000 determinations were made of the effect of alkali salts on the germination and growth of wheat under varying conditions.

In sand cultures the size of the particles does not influence the toxicity of the alkali. Loam soils tolerate alkali better than sand or clay. When the coarseness of the loam varies, the moisture is an important factor with regard to the tolerance of alkali as is seen by the behaviour of the plants.

Organic matter increases the resistance of plants to alkalis when the soil contains sufficient moisture but if the content in organic matter is high and the moisture supply low, the power of resistance decreases. In general the resistance to alkalinity increases with the moisture content up to the maximum for a good crop.

The toxicity of sodium chloride and sulphate seems to depend to a certain extent on the relation between the salt concentration and the percentage of moisture, but the

toxicity of sodium carbonate is largely influenced by the presence of organic matter which removes large quantities of sodium carbonate from the soil solution.

Conclusions.—(1) Loam soils and soils with a high water-holding capacity may be successfully cultivated even though their alkali content is in excess of that of other soils.

(2) Soils in which alkali decreases the yields should be kept as moist as is compatible with good plant growth.

(3) Manure, or other organic matter, may prove beneficial to alkaline soils, especially those rich in carbonates.

569—Results of Manurial Experiments on a Peat Soil in Holland.—MULDER, A. G., MEIJER, C., and HUDIG, I., in the *Verslagen van Landbouwkundige Onderzoekingen der Rykslandbouwproefstations*, No. 22, pp. 127-170, The Hague, 1918.

Results of 35 years of manurial experiments with chemical manures on a peat soil that had been cultivated for a long time, and which had been given farmyard manure in the last few years before the experiments were started. The experiments had the object of ascertaining whether the substitution for farmyard manure of chemical manures (nitrogen, phosphoric acid, potash and lime) would maintain the fertility of the soil. The crops grown were potatoes (several varieties), rye and oats.

The authors found that, in this peat soil rich in humus, the exclusive use of chemical fertilizers maintained the fertility at the same level during the 35 years of the experiments, provided that the ratio *bases to acids* was always well balanced. Farmyard manure applied alone, or together with chemical fertilizers, or alternately to them, did not show any superior fertilizing value to that of chemical fertilizers used alone.

The potato, which is especially exigent as regards potash, requires little nitrogen and still less phosphatic manure. Rye has the same requirements; oats, on the contrary, have special need for nitrogen, are less exigent for potash and still less for phosphoric acid. In any case no single one of the three chief fertilizing elements (nitrogen, potash, and phosphoric acid) can be excluded from the fertilizer applied to this peat soil without reducing the crop yield.

Some special observations are also given. Farmyard manure gave good results with potatoes (first year of cultivation), but the following crop (rye or oats), was not successful.

The best results were obtained with a complete fertilizer mixture containing nitrogen in the form of nitrate of soda. A fertilizer mixture without potash gave poor results:—the epigeal part of the potato was undersized and had a characteristic brownish

colour; with oats and rye, the grain was too small and light, while the straw was very brittle. A fertilizer dressing excluding nitrogen gave the same poor results, but the lack was less pronounced when phosphoric acid was excluded from the mixture. When the various chemical fertilizers were applied separately, the results were hardly any better, except that the crop obtained with potash alone, though lacking as regards quantity, was sometimes satisfactory as regards quality. In conclusion, in a complete mixture of fertilizers, nitrate of soda proved to be much better than sulphate of ammonia.

571—Investigations into the Utilization of Raw Mineral Phosphates in the United States.—I. WAGGAMAN, W., and WAGNER, R. C., The Agricultural Availability of Raw Ground Phosphate Rock, in *The Journal of Industrial and Engineering Chemistry*, Vol. X, No. 6, pp. 442-444. Easton, Pa., 1918. II. IDEM, The Use of Mine Run Phosphates in the Manufacture of Soluble Phosphoric Acid. *Ibid.*, Vol. X, No. 5, pp. 353-355, Easton, 1918

I.—*The Availability of Raw Ground Phosphate Rock*—The authors summarize the results of all the investigations into this subject made by the agricultural stations of the United States in the laboratory, greenhouse (23 experiments), and in the field (232 experiments). They come to the following conclusions:—

Taking into consideration only experiments which lasted at least five years, it is seen that the application of medium or large quantities of raw rock phosphate caused, in most of the soils tested, an increased yield in many crops during the first year. To be efficacious as a fertilizer rock phosphate must be spread evenly over the ground as a fine powder. The presence of decomposing organic matter increases the efficacy, probably because of the greater bacterial activity produced and the higher percentage of carbon dioxide given off. Fineness of the powder and the presence of organic matter together prolong the efficacy of raw phosphate rock for another year, or even more. On the other hand, as the action of superphosphate is more rapid than that of bone powder, basic slag and mineral phosphates, it is probably preferable to any other phosphatic fertilizer when the aim is to obtain rapid growth of the plants cultivated.

To obtain the best results with powdered rock phosphates they must be applied in larger quantities than superphosphate. Whether it be best to apply rock phosphates in a soluble or insoluble form to produce the most economical increase in yield depends on the nature of the soil, the cultural method, the price of the phosphates, the duration of the vegetative period, and other local factors. It is a question which, to a certain extent, must be solved by each farmer individually.

II—*The Use of Mine Run Phosphates in the Manufacture of Soluble Phosphoric Acid*.—Rock phosphate direct from the mine may be suitably treated in the electric oven without sifting or previous washing, thus avoiding the loss of low-grade waste. Experiments made with a load of 500 lbs. of mixed raw rock phosphate, coke, and sand (in the absence of silica), smelted in the electric oven for three hours, gave a yield of phosphoric acid corresponding to 98% of the total phosphorous and costing much less than if high-grade phosphates had been used.

If phosphoric acid thus obtained be used to transform rock phosphate into so called "double" superphosphate, the cost of production will compare favourably with that of producing ordinary superphosphates with sulphuric acid when there is a shortage of this acid.

574—Comparative Trials of Nitrogenous Manures in France.—BACHELIER, in the *Comptes Rendus de l'Académie d'Agriculture de France*, Vol. V, No. 5, pp. 164-170. Paris, February, 1919.

M. Schloesing recently studied the possibility of using as nitrogenous manure large quantities of ammonium nitrate made during the war for the production of explosives. He took into consideration his pot experiments with forage maize from which he concluded that 1 lb. of ammonium nitrate had the same effect on vegetation as 1 lb. of nitrogen supplied by ammonium sulphate. For his tests he divided a good, homogeneous field, free from weeds, into squares of 119.60 sq. yards, separated from each other by a path 3.28 feet wide. The soil had never been manured or fertilized.

To compare the effects of ammonium nitrate with those of sodium nitrate or ammonium sulphate, used separately or together, these manures were mixed with superphosphate in quantities varying with the amount of nitrogen supplied, and spread on the land on May 31, 1918. On June 1st beets were sown in the plots. After the customary hoeing the plants were harvested on December 5th. In the table showing the results a comparison of the weights and densities of the roots in the plots with the nitrogenous manures and the control ones without, an increase in favour of ammonium sulphate was found. If, however, the yields obtained with sodium nitrate is compared with ammonium nitrate, it is seen that, in one direction, the difference lies in small quantities, and in the other direction in large ones. These first tests, therefore, seem to confirm the theory that the unit of nitrogen in ammonium nitrate has the same value as in the other salts hitherto supplied commercially. When working in the field the small causes of error due to the nature of the soil, which, in spite of its homogeneousness, are always liable to occur, must be taken into consideration.

The author points out that, in the plot which had received the largest amount of sodium nitrate, "jaundice" (of bacterial origin) occurred to a very serious extent. He connects this observation with those frequently made by him with respect to the action of sodium nitrate on beets. In a soil with clay or siliceous clay sub-soil, after a period of intense drought in August and September, beets run a grave risk of being attacked by the so-called "heart disease of beets," studied, together with "jaundice" by Prilleux and Delacroix, and due to *Phoma Betae*. The damage is all the greater the larger the quantity of sodium nitrate which has been added as fertilizer. For this reason the proportion of sodium nitrate is often reduced and the quantity of ammoniacal or organic nitrogen increased. As ammonium nitrate does not produce this intense "jaundice" it seems that its use in large quantities may be recommended wherever it is unwise to use equivalent quantities of sodium nitrate. It may, therefore, be admitted that ammonium nitrate is as useful for agricultural purposes as would be expected from its composition.

578—On the Absorptive Power of the Tips of Roots.—COUPIN, H., in the *Comptes Rendus de l'Académie des Sciences*, Vol 168, No. 10, pp. 519-522. Paris, March 12, 1919.

It is generally admitted that roots can only absorb liquids by their middle region, often covered by absorbent hairs, and cannot do so either by their bare base or by their tip. As the author was led to doubt the truth of this opinion by numerous observations, he carried out a series of researches, the results of which have substantiated his doubts. He quotes some of his results as examples and states that all his other experiments gave exactly the same results.

Two germinations of the grey pea (*Pisum arvense*), for example, each having a gemmule barely visible and a root 3 cm. long, were both placed in the same flask: one, A. simply suspended in the damp air, the other B. also suspended in the same air, but with 2 to 3 mm. of the tip of its root dipping in the water placed in the bottom of the flask, which was placed in a dark incubator kept at 24° C. After 24 hours, it was found that the root of B. had grown much more than that of A.; B. was lifted every 24 hours so that its root was only in contact with the surface of the water at its tip. At the 144th hour the final result was that A. was dead, while the root of B. was 9 cm. long and had 20 root hairs (that of A. was only 4 cm. long, with 3 root hairs) while its gemmule was 6 cm. long (that of A. being hardly visible).

The author gives the results of similar experiments with *Ricinus*, the American bean and pumpkin. They agree in every way with the previous ones and show that the young plant whose root tip alone is immersed

in water develops normally, developing its tap root a good deal and giving out a number of root hairs, while its aerial part increases notably in length; in short, develops like a plant all of whose root is immersed in the liquid. Owing to the behaviour of the control plant there is no need to entertain the hypothesis that the growth is due to water extracted by the plant from the damp air surrounding it or to that contained in its cotyledons or albumen.

Conclusions.—(1) The root, contrary to the statements in classic works, can absorb water through its tip, which includes the cap (if present) and the terminal meristem, which was previously denied any absorbent power.

(2) The water thus obtained by the root suffices for it to attain the maximum development compatible with the small quantity of food material available and with life in darkness.

579—Influence of the Nature of the Soil and Manuring on the Content of Nitrogen and Mineral Elements in Cultivated Plants.—MASCHHAUPT, J.C., in the *Verslagen van Landbouwkundige Onderzoekingen der Ryksland bouwproefstations*, No. 12, pp. 25-116. The Hague, 1918.

Experiments carried out for 7 years at the Royal Agricultural Experiment Station at Groningen on a heath soil, a peat soil, a marsh soil, a loamy soil, and a clay soil, using nitrate of potash, nitrate of soda and sulphate of ammonia as fertilizers. The soil of the numerous experiment plots has been analyzed and the nitrogen and inorganic contents of the plants determined.

Results.—*Influence of the nature of the soil.* Marsh soil, when dried and mixed with sand, is excellent for crops; of all the soils tried by the author, it was this soil that best satisfied the nitrogen requirements of the cultivated plant; it always gave the crop with the richest nitrogen content, but on the contrary, with the poorest phosphoric acid content, although the phosphatic manuring was the same for all the peat and heath soils.

As regards the mineral and nitrogen content of the plant the nature of the soil had more influence on the straw of cereals and the epigeal part of the beet and potato than on the seeds, root and tuber. On the other hand, this influence had more effect on the epigeal part of the beet and potato than on the straw of cereals. In this connection, great differences were observed in the contents of nitrogen, phosphoric acid, lime and potash (for the latter especially in the haulms of the potato).

The influence of the nature of the soil on the silica content of the straw of cereals was still more manifest; with a cereal grown in clay soil, this content was, on an average, 5 times greater than in a cereal grown in sandy soil. The cereals extracted much more silica from a loam or clay soil than a heath, peat, or marsh soil but without extracting

more basic elements at the same time. Plants grown in clay soil were distinguished from plants grown in loamy soil by higher nitrogen, phosphoric acid, potash and silica contents, which agrees with the composition of these soils as shown by analysis.

Influence of manuring.—Generally speaking, nitrate of potash does not appear to increase the yields as much as nitrate of soda. The nature of the nitrogenous manuring (nitrate of soda, nitrate of potash and ammonium sulphate) has little influence on the nitrogen and ash content of cultivated plants. On any case, with mangels (root and epigeal part), the application of nitrate of potash notably increased the potash content, while that of nitrate of soda considerably increased the soda content.

When comparing for the same soil, the respective composition of plants grown (a) without nitrogenous manuring, (b) with nitrogenous manuring, it was generally found that, in the first case, the nitrogen, phosphoric acid, sulphuric anhydride and chlorine contents of the plants were higher, while the contents of basic elements had hardly increased at all or were even similar to those found in the second case (with nitrogenous manuring). This apparently paradoxical fact is probably a special case of the following general rule; anything that causes a decrease in yield of cultivated plants produces an increase in their content of nutritive elements, more for nitrogen and the acid elements than for the basic elements.

587—Investigations into Seeds, in the United States.—I. HARRINGTON, G. T., and CROCKER, W., Resistance of Seeds to Desiccation, in the *Journal of Agricultural Research*, Vol. XIV, No. 12, pp. 525-541. Washington, September 16, 1918. CROCKER, W., and HARRINGTON, G. T., Catalase and Oxidase Content of Seeds in Relation to their Dormancy, Age, Vitality, and Respiration; *Ibid*, Vol. XV, No. 3, pp. 137-174. Washington.

I. *Resistance of Seeds to Desiccation.*—The artificial desiccation of seeds to hasten their ripening has raised the question whether this process may prove detrimental to the seed. Up to the present the opinion of workers on this subject has varied greatly.

The authors subjected seeds of wheat, barley, Sudan grass (*Holcus halepensis sudanensis*) Kentucky blue grass (*Poa pratensis* L) and Johnson grass (*Holcus halepensis*) to desiccation under varying conditions and during different periods. They found that the germinative faculty was not appreciably affected when dried to less than 1% of moisture and, in the case of Kentucky blue grass and Johnson grass, when the moisture content was reduced to 0.1%, although the vigour of Kentucky blue grass seedlings was greatly reduced. This vigour was still more reduced by drying in a vacuum oven for 6 hours at 100°C., although the

germination capacity was not materially affected.

II.—*Catalase and Oxidase Content of Seeds in Relation to Their Dormancy, Age, Vitality, and Respiration.*—At the Seed Testing Station of the U.S. Department of Agriculture Bureau of Plant Industry it was found that alternating temperatures favour the germination of seed of certain fodder grasses. The study of this phenomenon led to that of delayed germination and the physiology of germination in general.

The catalytic activity of the seeds was first determined by measuring the volume of oxygen given off in an excess of hydrogen peroxide solution neutralized to phenolphthalein by the addition of deci-normal caustic soda. It was found that certain factors modify this activity. For instance, crushing the seeds excessively, preserving powdered seeds in a desiccator or drying seeds which have been kept in a germinator, reduces the catalytic activity. In a sample of wheat the catalytic activity of the embryo was found to be 28 to 29 times that of the endosperm, and the same relation exists between the oxydase and respiration activities.

Unripe Sudan grass and Johnson grass seeds have a greater catalytic activity than ripe ones.

The physiologically inactive organs of seeds have only a small fraction of the catalytic activity of the caryopses. The oxydases are, however, as active in the vital as in the non-vital organs.

Retention in the germinator is not so favourable to germination, but considerably reduces the catalytic activity and respiratory intensity of Johnson grass seeds. The effect on the oxidase activity is less marked.

The optimum temperature for delayed ripening in dried peach kernels seems also to be the optimum for increasing catalase activity. Oxidase activity, however, decreases with delayed ripening, although the auto-colouration of the mass of powdered seed exposed to the air increases. During the germination of seeds of gramineae the catalytic and respiratory activity increase rapidly, but there is no intensification of oxidase activity.

In certain seeds, such as those of Johnson grass, there is a close correlation between catalytic activity and respiratory intensity, but no relation between these two factors and the vitality of the seed or the vigour of the seedlings springing from it.

No general conclusion as to the catalytic activity of all the seeds tested can be drawn from the results. There is, however, reason to believe that seeds may be divided into different physiological types for which more or less general criteria may be laid down. It may also be said that the catalytic activity of seeds is more parallel to physiological behaviour than is the oxidase activity.

588—The Work of the French Sugar Beet Seed Commission for the Year 1918.—SAILLARD, E., in the *Comptes Rendus de l'Académie d'Agriculture de France*, Vol. V, No. 9, pp. 323-330. Paris, March, 1919.

The author summarizes the work done during the year 1918 by the Sugar Beet Seed Commission, instituted at the French Ministry of Agriculture. The programme included:—The institution of competitions (a competition between the French producing houses and a competition for machines for drying the seed); the *foundation of a selection Station*, to carry out the improvement of the best of the present varieties or the creation of new varieties and to study the problems relating to the production of sugar beet seed; and finally, the *institution of cultural tests* in order to improve the cultivation of the industrial sugar beet.

The results obtained in the Selection Laboratory are given below:—

In order to improve existing varieties and to create new ones, the selectors started with some of the best varieties grown industrially. Three years are required to work out one generation:—*First year*: the seed is sown in spring and the beets are harvested in autumn. *Second year*: The best beets are replanted in spring; in the autumn their seed is gathered separately and preserved in separate bags. *Third year*: By means of a cultural test, the seed from each bag is compared with seed from the first year, kept as a control; the seed that does not transmit the characters of the "mother" beet is discarded.

The cycle of work was started in 1917; good quality commercial seed belonging to the best varieties was sown; at harvest time, the beets with the requisite qualities of foliage, shape and neck, were cleaned with a wooden spatula, numbered with steel tags, weighed with a spring balance and classified in order of weight. They were then bored with a gimlet scraper, the pulp obtained being used to estimate the sugar content by means of the polarimeter. The beets analyzed are classed, according to their weight and sugar content, in four groups:—(1) family heads; (2) choice; (3) third pick; (4) rejected. The family heads were observed separately and replanted alone or in groups of 2, 4 or 6 beets belonging to the same variety or two different ones. At flowering time they are surrounded by frames covered with cloth to avoid hybridization between adjacent groups (it is best to place the beets in the open air in a plantation, sufficiently far from any possibility of hybridization, for the seed bearers, when placed under cloth during flowering produce less seed than when growing in the open air).

The sugar Beet Seed Commission was also instructed with the duty of ascertaining how to increase the yield of sugar per unit area. Comparison of the yields for the 10 years 1904-1913 in the various regions of northern

Europe shows that the climate has a great influence on the yield of sugar per acre. The sugar beet needs a great deal of water, which should be supplied very gradually. Soil worked deeply and of even tilth and texture is more efficacious for storing up water. The results of the cultural tests depend in great part on the cultivation and use of manures. The quality of the sugar beet seed depends on its germination capacity and on its selection brand. The germination capacity can be found in the laboratory, but not so the selection brand; this can only be received with confidence if it gives good results and that is why it is so essential to produce seeds of a certain brand.

591—Rosen Rye, a New Variety with a High Grain Yield Obtained by Selection at the Michigan Agricultural Station, U. S. A.—SPRAGG, F. A., and NICHOLSON, J. W., in *The Journal of Heredity*, Vol. IX, No. 8, pp. 375-378. Washington, December, 1918

This new variety, obtained by selecting rye from Russia, is distinguished from the local varieties by the following characters:

(1) Short strong straw. (2) High percentage of setting, in good years as much as 99% (compared with approximately 50% for the ordinary varieties). (3) Very developed grain, exceeding the glumelles. (4) Ears of the same length as those of the ordinary varieties, but much more compact and larger, with square sections. (5) As a result of the characters of the ear and grain, very high grain yield:—an average of 19.9 to 21.5 cwt. per acre, as compared with 7.2 and 7.9 cwt. for the ordinary varieties.

These qualities show that the cultivation of this variety should be extended as much as possible in order to substitute it for the local varieties. As rye, like all cross-fertilizing species, is subject to hybridization from natural crosses, the propagation fields must be isolated and most carefully controlled in order to prevent the new variety from degenerating rapidly. This is being done by the Michigan Crop Improvement Association in collaboration with the Michigan Agricultural Station, and farmers who undertake to produce and sell controlled seed guaranteed to contain 99% of seed of the Rosen type.

LIVE STOCK AND BREEDING

614—A New Parasiticide.—AGNOLETTI, G., in *La Clinica Veterinaria*, Year 42, No. 4, p. 109. Milan, February 28, 1919.

The very serious infection of horse mange that occurred during the war was dealt with by several methods of treatment, which can be divided into 5 categories:—steam (sulphuration) method—solution method—emulsion method—soap method—pomade method. As the author was able to try these on a large scale, he found that the last method is the

best because it adheres and allows of continuous contact between the remedy and the skin. He never observed, however, the disadvantages attributed to fats as co-hibents interfering with the physiological functions of the skin. Of the pomades used, that prepared from thiometa methylene gave the best results. This new compound was prepared and its properties studied by Dr. Tirelli, Chemist to the firm of Zambelletti. It is prepared by acting on ammonium thiocarbonate with sodium menthansulphoxylate or ammonium sulphide with sodium methansulphoxylate in the presence of acid. The thiometamethylene slowly splits up into formaldehyde, sulphuretted hydrogen and sulphur; it has, therefore, a combined antiseptic and insecticidal action. It has been tried as a remedy for fleas and lice in experiments carried out by Prof. Pugliese, Director of the Institute of Experimental Physiology of the Royal School of Veterinary Medicine at Milan.

In order to obtain the keratolytic action necessary so that the active principle should penetrate through the skin, a certain quantity of sodium sulphide was added to the excipient (which consists of a soapy mass soluble in water and alcohol). A single application of this pomade was always sufficient to obtain a complete cure and the growth of the hair was not checked, whether in the horse, mule or dog. The author has concluded that "the treatment of mange in our domestic animals possesses a quick, safe and very practical remedy in thiometamethylene pomade."

625—The First Official Attempts to Establish Sheep in Japan.—GUERIN (French Consul at Yokohama), in the *Bulletin économique de l'Indochine*, Year XXXI, New Series, No. 133, p. 1129, Hanoi-Haiphong, November-December, 1918.

In order to render Japanese spinners independent of foreign countries as regards their supply of raw material, the Imperial Government has, since 1917, established sheep-rearing stations at Takikawa (in Hokkaido) and in other places. The desire is gradually to build up a sheep population. The first attempts have been crowned with success and already some hundreds of lambs are ready for distribution to the farmers.

At present the total number of sheep in the Empire consists of only 3,590 head, and the annual production of wool is only 13,200 lbs. The Japanese wool industry is, therefore, almost entirely dependent on foreign supplies. But the war seems to have opened the Government's eyes, for they are trying to make up for this lack of raw material, although the climatic conditions—which are mostly damp—are not very favourable to sheep rearing in Japan.

The official rearing stations already possess 500 picked ewes for breeding purposes. This number will soon be doubled owing to

the number bought in Australia, China and in both Americas. Eighty head imported from China have been sent to the Tomobe farm, which is situated in the prefecture of Ibaraki. A lot of 300 was brought from Australia (part was placed at the above mentioned farm at Hokkaido and another, of about 100 head, in that of Kumamoto). Fifty sheep for the Tomobe station have just arrived from South America. Eighty sheep are also expected from the United States.

The 500 ewes imported in 1917 have already produced 300 lambs in 1918, and as soon as these are strong enough, they will be distributed to the farmers.

The Government is now studying the question of the professional training of sheep rearers, which is naturally of great importance for the success of its interesting undertaking.

633—The Domestication of the African Elephant in the Belgian Congo.—LEPLAE, E., in the *Bulletin Agricole du Congo Belge*, Vol. IX., Nos. 1-4, pp. 33-77. London, March-December, 1918.

The author gives the history of the domestication of the elephant throughout the world from the earliest time to the present day, and describes attempts to utilize the Asiatic elephant in Africa, the capture and training of the African elephant at the Api Station, founded by Commandant Laplume and his collaborators (M. Vermeesch replaced Commandant Leplume during the war), and the utilization of the elephant on the farm and in the forest.

FARM ENGINEERING

637—Harvesting With a Tractor.—PLUCHET, E., in the *Comptes rendus des Séances de l'Académie d'Agriculture de France*, Vol. IV, No. 30, pp. 830-838. Paris, October 9, 1918.

The author gives information on the harvest work with tractors that he carried out at Trappes (Seine-et-Oise) as well as that done by trustworthy farmers.

At Trappes, a 10-20 H.P. Titan tractor worked with difficulty in some strong winter wheat; it had to run free on one and sometimes two sides; in 10 hours it harvested 24.7 acres with a consumption of 14.2 pints of paraffin, 1.8 lb. of oil and 0.26 lb. of grease per acre. In a less heavy crop (spring wheat, oats) the same machine cut 11.1 acres, with a consumption of 9.8 pints of paraffin and 2.2 lbs. of oil per acre. On another farm (Eure) a Titan hauling a MacCormick binder cutting a width of 6 ft. 11 in., cut nearly 15 acres a day, consuming 10.6 pints of paraffin per acre (a crop of average weight).

An Emerson tractor with a Massey-Harris cutting a 6 ft. 3 in. swathe, cut 10 acres a day, using 8.5 pints of petrol per acre.

At Voisins-le-Bretonneux, a Case tractor hauling a 6 ft. 11 in. Deering, cut 8.6 acres a day using 11.4 pints of petrol per acre; on a slight slope the tractor could barely reach a speed of 1.7 miles per hour—the minimum speed required for a harvester cutting a heavy crop.

At Manet (Trappes), a Case drawing two binders, one cutting 36 in., the other 59 in., cut as much as 32.1 acres in a day (average oats); it cut 2.20 acres in an hour, with a consumption of 17.6 pints of petrol and 1.1 lb. of oil.

At Troumoreau (Villepreux) large Case tractor, drawing two 6 ft. MacCormick binders, cut an average of 17.4 acres a day (wheat and oats), consuming 7.2 pints of petrol per acre.

Judging from experiments in applying power to harvest work, the tractor seems specially suitable for cereal crops whether important or not, as the tractor is particularly indicated for light work that requires to be done quickly.

AGRICULTURAL INDUSTRIES

649—On the Preservation of Oils.—*Feuille d'informations du Ministère de l'Agriculture*, Year XXIV, No. 11, p. 5, Paris, March 18, 1919.

Note communicated by the "Service de l'oléiculture."

In 1918 experiments were carried out on the treatment of the by-products obtained in the manufacture of oils, in order to find out the best way of treating the residuum of olives and of preserving olives to be used for making oil, and the oils themselves subjected to the influence of the atmosphere and light.

The conclusions arrived at are given below:—

(1) The best recipients for preserving oils are those that best isolate them from atmospheric agencies and sudden changes of temperature; the products keep perfectly in stoneware jars that are kept quite full.

(2) When the products are being removed, when they are liable to be acted on by the air, there is always an appreciable increase of acidity; this increase in acidity is all the greater the more the volume of liquid and the surface in contact with the air are greater.

(3) Metal recipients (tin-plate) are not advisable; they can be used, however, if placed in a store with a stable average temperature (12-15°C.).

(4) Glass recipients are always preferable to metal ones, for they isolate the liquid better from changes of temperature.

(5) In recipients made of ordinary glass, white ("frosted"), green, yellow and blue glass, placed in full light during all the experiments, the oils were not affected by

the light in either closed or open rooms. The increase in acidity of the oils preserved in these recipients was always greater than that of oils kept in stoneware jars, about equal to that of oils kept in tins protected from the air and lower than the acidity of the drainage of tins.

Certain practical rules for the preservation of oils can be deduced from these conclusions. But the most curious observation was that, in bottles coloured red or pink, the acidity of the oils had a marked tendency to decrease. This interesting observation will be verified experimentally by M. Bonnet, Director of the "Service de l'oléiculture," at Marseilles.

651—Preservation of Beet Tops in Silos.—

CHAVASTELON, R., in the *Comptes rendus de l'Académie d'Agriculture de France*, Vol. V, No. 7, pp. 221-223, Paris, February 19, 1919.

Samples of sugar beet tops ensilaged in October-November in a silo of beaten earth covered with clay soil had been obtained in the following March from the sugar refinery at Bourdon (France); they were at once shut up, pressing them down tightly in glass jars provided with glass covers.

Part was analyzed at once, the remainder being stored in a cellar after the covers were sealed on the jars with tallow, so that the changes could be followed.

When the jars were opened in May in the following year, i.e., after 14 months, the product had the same appearance and its odour was rather pleasant.

The author (Professor in the Faculty of Science at Clermont-Ferrand) gives the results of his analyses of samples taken immediately and samples kept 14 months.

The practical lesson of the experiment is that, if the silage is well made, it can be kept in reserve if it is not utilized the first year, without any fear of losing any of its food value for a year or more; the perfection of the preservation depends on the care taken to keep the silage from the action of the air, as it should be kept under anaerobic conditions.

For these reasons the silo should be cemented, with smooth internal walls in the shape of rectangular parallelepipeds, open in front and above (e.g., 5 ft. wide and 6 ft. 6 in. high), the superior and anterior faces should be closed by slides fitting between the lateral walls, fixed in front when filling and covered above, after the silage has been beaten down well by a 9 in. layer of beaten earth; the more permeable the earth the thicker should be the layer used. The layer of earth should be rounded, being kept in shape by the application of fresh earth if required during the period of preservation. In hot weather the earth should be watered sufficiently to prevent it from cracking.

652.—Chemistry of Sweet Clover Silage in Comparison With Alfalfa Silage.—SWANSON, C. O., and TAGUE, E. L., in the *Journal of Agricultural Research*, Vol. XV, No. 2, pp. 113-132. Washington, October 14, 1918.

After the alfalfa and sweet clover for the experiment had been cut they were left to wilt in the sun for 2 hours, then chopped up, and packed tightly into quart milk bottles which were then hermetically sealed. The alfalfa was bottled alone, the clover both alone and with 10 times its amount of ground maize. The material in each bottle was weighed (about 700 gm.). During the first week three bottles of each fodder (alfalfa, clover, clover and maize,) were opened each day, during the second week every other day, each week during the next four weeks, and then each month for as long as was necessary. The silage was of the best quality, and when open it was weighed and the colour and quality judged. The moisture content of the fodder in each bottle was determined by 100 gm. samples. The aqueous extract was made with 100 gm. samples, using 43 cc. of carbon dioxide free water, shaking by machine for 2 hours, and filtration through a linen cloth. The filtrate was centrifugized for 5 minutes, and completely freed from the super-natant dark liquid by passing through a folded filter. In this filtrate were determined: (1) The acidity by titration with phenolphthalein; (2) the acidity by the hydrogen electrode; (3) the amino-nitrogen by titration in the presence of formaldehyde with thymolphthalein as indicator; (4) the amino-nitrogen by titration in the presence of formaldehyde to a certain hydrogen-ion concentration determined by the hydrogen electrode; (5) the total nitrogen; (6) the total nitrogen in the water extract not precipitated by phosphotungstic acid.

The alcoholic extract was prepared with another 100 gm. sample of silage by the addition of 250 cc. of 95% alcohol. After some time enough carbon dioxide-free water was added to bring the volume up to 500 cc. The subsequent treatment was the same as that for the aqueous extract.

The loss of weight of the silage after 98 days was about 1%. Losses caused by fermentation in a hermetically sealed silo are, therefore, insignificant.

The acidity of the alcoholic extract of the three kinds of silage was higher than that of the water extract when titration was made to the point of colour change for phenolphthalein. With the electrometric method and titration to a hydrogen-ion concentration of $\text{PH}=8.3$ (point of colour change for phenolphthalein), the difference between the results obtained with the aqueous extract and the alcoholic extract was insignificant. The higher values obtained by the colorimetric method for the alcoholic extract were probably due to the strongly coloured matter

extracted by the alcohol, thus hiding the end point.

Most of the acidity developed during the first 14 days.

The addition of maize meal to sweet clover increased the acidity of the silage.

The amino-nitrogen content was practically the same in the aqueous and alcoholic extracts. The amino-nitrogen content of alfalfa silage was much higher than that of clover silage without maize flour. The addition of maize flour to clover does not influence the amount of amino-nitrogen developed.

The amide-nitrogen content determined by Stutzer's method was a little higher than the amino-nitrogen content determined by the formaldehyde method. The amide-nitrogen present was about one-half of the total nitrogen.

About $\frac{2}{3}$ of the total nitrogen of the silage was soluble in water and in 50% alcohol, the action of the two solvents being about equal.

The results seem to show that it is more easy to make silage from sweet clover alone than from alfalfa alone.

653.—Suitable Storage Conditions for Certain Perishable Food Products.—U.S. Department of Agriculture, *Bulletin No. 729*, 10 pp., Washington, July 24, 1918.

For some years the U.S. Department of Agriculture has been collecting information on the factors influencing the keeping of various perishable agricultural products in storage. Some of this information has already been published in various bulletins of the department, but much has not been made available for the use of those managing big storage warehouses. Recently the Federal Reserve Board asked the Department of Agriculture for information on the storing of the principal perishable commodities subject to a preferential rate of re-discount (best storage conditions, length of storage, percentage of shrinkage during storage, etc.).

The information given is summarized in a table, and deals with apples, potatoes, sweet potatoes, onions, cabbages, eggs, frozen eggs, poultry. The following data, extracted from the table, deal exclusively with the cold storage of perishable products.

Apples.—Apples to be cold stored should be suitably sorted and packed, rapidly stored, cooled, and carefully inspected. The temperature should be from 31° to 32° F., and the relative humidity from 85 to 90%. Duration of storage, from 3 to 6 months for winter varieties. Shrinkage in storage, from 2 to 5%.

Potatoes.—Potatoes are sometimes cold stored. The temperature should be from 35° to 49° F. and the relative humidity 80 to 85%. Duration of storage, 7 months or more.

Onions.—When onions are cold stored the temperature must be from 32° to 36°F., and the humidity low. They should be examined every month.

Eggs.—The temperature should be from 20° to 32° F., and the humidity from 82 to 85%. Fresh clean eggs with unbroken shells can be stored for 9 to 10 months. The sale of preserved eggs begins at the end of summer and continues till March. The maximum shrinkage is 5.5%.

For frozen eggs the cold storage temperature must be from 0° to 10° F. They should be transported in refrigerating waggons.

Dressed poultry.—Poultry to be cold stored must be fresh. The best temperature is from 0° to 10°F. The duration of storage is 12 months, and the shrinkage 1 to 3%.

Butter.—The temperatures must not exceed 2° F. Butter to be held in cold storage for several months must be made from cream of limited acidity, pasteurized, cooked, and churned without further ripening. The shrinkage is in general from 0.5 to 1%. Storage should not last more than 12 months.

Fish.—Fish may be stored for not more than one year at a temperature of 10°F., and must be inspected each month. The shrinkage is of no commercial importance.

PLANT DISEASES

659—A Third Biologic Form of *Puccinia Graminis* on Wheat.—LEVINE, M. N., and STAKMAN, E. C., in the *Journal of Agricultural Research*, Vol. XIII, No. 12, pp. 651-654. Washington, D.C., June 17, 1918.

Up to the present two biologic forms of *Puccinia graminis* Pers. have been reported—*P. graminis* f. *Tritici* Erikss. and Henn. and *P. graminis* f. *Tritici-compacti* Stack. and Piem.

On October 18, 1917, *P. graminis* was found on a clump of wild wheat at Stillwater, Oklahoma. Repeated cultural experiments made by the Agricultural Station at Minnesota University and the U.S. Department of Agriculture, Bureau of Plant Industry, showed the rust to be a form distinct from the two biologic ones mentioned. Experiments on this third unidentified biologic form are in progress.

660—Yellow Leaf-Blotch of Alfalfa Caused by the Fungus *Pyrenopeziza Medicaginis*—JONES, F. R., in the *Journal of Agricultural Research*, Vol. XIII, No. 6, pp. 307-329. Washington, May 6, 1918.

Under the name of Yellow-Leafblotch of alfalfa the author describes a serious fungoid disease of alfalfa, observed in America between 1915 and 1917 only. It has been known for a long time in Europe, where it is not regarded as serious. In the United States it has so far been observed in Vermont,

New Jersey, Virginia, New York, Ohio, Kentucky, Tennessee, Wisconsin, Minnesota, Iowa, Kansas, South Dakota, California, Idaho, Oregon, and Washington. There seems no doubt that it occurs in all the large alfalfa-growing districts of the United States.

The disease may usually be distinguished by the appearance of a long yellow blotch on the leaf. Later small orange-coloured points (pycnidia) appear on the upper surface of the leaf. These points soon turn deep brown, and even almost black. The affected part of the leaf dies and, on the under surface, rarely on the upper one, appear small black dots (apothecia) different from the first ones. The disease also attacks the stems, but less badly than the leaves.

The disease injures the plant directly by slowly killing the affected leaves, or indirectly by favouring the access and development of other organisms in the weakened leaves.

The causal organism, *Pyrenopeziza medicaginis* Fuckel, is a discomycete which, as has already been said, produces first a conidial stage (*Sporonema phaeoidioides* Desmazieres) on the living leaves, and later, ascigerous stages (*Pyr. Medicaginis*) on the part already killed by the fungus. The fungus has been grown in cultures and both stages of the parasite produced.

Infection seems to occur only through ascospores which, upon germinating, penetrate the epidermal cells of the leaf. The fungus hibernates on dead leaves, infected the previous autumn.

Cutting diseased alfalfa before the ascigerous stage has developed on infected leaves appears to hold the disease in check.

INJURIOUS INSECTS

670—*Euclemensia Bassettella* a Microlepidopteron Parasitic on *Kermes* Spp., Coccidae Infesting *Quercus* Spp. in Missouri and Texas, U.S.A.—HOLLINGER, A. H., and PARKS, H. B., in *Entomological News*, Vol. XXX, No. 4, pp. 91-100, Philadelphia, April, 1919.

Euclemensia bassettella (Clemens) has been reported in Connecticut, Florida, Kansas, Massachusetts, and Texas. The authors, who found it in large numbers in Missouri and Texas, believe it to be common in the western half of the United States at least, and that the species exists in nearly all the States to the east of the Rocky Mountains and probably throughout the North American Confederation.

It was originally thought that the larva of the insect feeds on the galls which develop on oak trees. It was later found that, like several other microlepidoptera, *E. bassettella* in the larval state, is parasitic on the scale insect (*Kermes* spp.) which live on oaks and are mistaken for galls. The authors' investigations confirm this theory.

In April, 1917, near Albany, Gentry County, Missouri, Parks found a specimen of *Quercus imbricaria* Michx., badly infested with *Kermes peltiti* Ehrh. Subsequent careful investigations showed that some of the coccidae contained larvae of a lepidopteron identified by Busck, after it had been bred in the laboratory by Hollinger, as *E. bassettella*. The breeding was begun on June 9th and the first adult insect emerged on the 27th of the same month. By the middle of July, 23 adults had already emerged. On July 12th, some of the apparently normal *Kermes* were opened, and in them were found three larvae and four pupae of the lepidopteron. The adults of these were observed at liberty during July, 1917, and were found by Dr. Haseman visiting onion flowers. An adult was taken by Hollinger in his own kitchen garden on August 15th.

In January, 1918, the authors found *Q. stellata* Wangenh. near Corsicana, Navarro County, Texas, badly infested with *K. galliformis* Riley. The coccidae were seriously attacked by larvae of *E. bassettella*. Adult microlepidoptera emerged in the laboratory from collected material toward the middle of July. *E. bassettella* has been observed as a parasite of the coccid in other localities in Texas, on *Q. stellata*, *Q. marylandica* Moench, *Q. virginiana* Mill., *Q. undulata* Torr., and *Q. nigra* L. On August 3, 1918, a single adult *E. bassettella* was found by Parks in a field of cultivated onions in Robertson County.

The insect seems to have a single generation a year. So far no parasite is known to attack *E. bassettella* in any of its stages. The insect has been found sufficiently plentiful

to reduce appreciably the number of the coccid on which it preys.

Morphological descriptions are given of the larvæ, pupa, and adult of *E. bassettella*, together with information on the habits of the insect.

679—*Phylloxera Stanfordiana* N. Sp., a Rhynchote Observed on *Quercus Douglasii*, in California.—FERRIS, G., in *Entomological News*, Vol. XXX, No. 4, pp. 103-105. Philadelphia, April, 1919.

The genus *Phylloxera* seems to be very little represented in the west of the United States. In addition to *Phyll. vastatrix* Planch. of the vine the only species in California appear to be the two reported by Davidson—*Phyll. popularia* Perg., on poplars, and *Phyll. salicola* Perg. on willows.

The author describes another species of *Phylloxera*, apparently new to science, found on oak. It is probably the first *Phylloxera*, found on this plant to the west of the Missouri. It is *Phyll. stanfordiana* n.sp., and was found by the author on *Quercus Douglasii* in the grounds of Stanford University, California, on September 10, 1918.

A description is also given of the female of the species of *Phylloxera* found chiefly on twigs of *Populus trichocarpa* and *Salix* sp. at San Francisco Creek, near Stanford University, and of *P. candicans* at Salt Lake City, Utah. The author identified it *Phyll. salicola* Perg. It is a little doubtful whether the species in question is really *Phyll. salicola* Perg., although it is similar to this species in many of its characters. There is no doubt that it does not correspond to *Phyll. popularia* Perg.

AGRICULTURAL ECONOMICS

CO-OPERATIVE CREDIT IN ALSACE AND LORRAINE

Towards 1880 the plan was formed of founding in Alsace and Lorraine on sound bases an agricultural credit bank, and the first idea entertained was to introduce into the country the use of savings and loans banks of the Raiffeisen type. The aim of these is, as is known, to give small village capitalists an opportunity to lend money, with all necessary security, to their fellow-villagers who are in temporary need of it. Banks of this kind produced excellent results in Alsace and Lorraine. In particular, they rid the country districts of the usury which was preying on them. Their management always showed itself to be satisfactory: the Raiffeisen banks were unlimited liability societies, and therefore all their members had the greatest interest in narrowly watching the progress of their business and in trusting only trustworthy men.

At the same time as these banks were being formed, more or less everywhere, they grouped themselves in federations, and as in one village the richer lent to the more needy inhabitants if they were honest and industrious, so the banks which had the largest resources made advances to those in need of them, through the medium of a central agency which received surplus funds, and distributed them, determining their mode of employment.

Later this powerful organization, which extended all over Germany, was further improved and was divided, in every German State into two distinct but closely united sections.

The first of these sections comprised departments of inspection, auditing, advertisement and technical instruction, and spread among farmers indispensable know-

ledge as to the scientific use of chemical manures and of agricultural machinery, the consolidation of holdings, the improvement of agricultural processes, etc. The second section was concerned with questions connected with money: it was a veritable bank which centralized the funds contributed to it by the banks and also did an important trade in machinery, manures and supplies of all kinds, which were bought wholesale and could therefore be resold on the best possible terms.

While the first section was constituted as a local society, having its office at Strassburg, the second took, on the other hand, the form of a Strassburg branch of a large agricultural bank of which the head office was in Berlin and in which all the Raiffeisen banks, including those in Alsace and Lorraine, had shares. The shares were of a uniform price between 1,000 and 1,250 francs, were all nominative, and gave the right to a fixed dividend which might not exceed 5 per cent. They could not occasion any speculation, and since they were not quoted on the Exchange they were not subject to the fluctuations of the market. It was through the medium of these branches, which were established in all German States and provinces, that funds were transmitted to Berlin to be used in the best interests of agriculture generally.

Alsace and Lorraine, being countries of small but very productive farming, always have available capital which they are not able to use within their boundaries. In consequence the branch at Strassburg, since it could not invest in Alsace and Lorraine all the capital which came from the rural banks of the two provinces, was obliged to send a considerable surplus to the head office in Berlin. At the date of the armistice, 11 November, 1918, the funds sent to Berlin by the Strassburg branch amounted in round figures to the sum of \$17,000,000.

After the armistice this branch was sequestered as a German house but continued its business under the supervision of administrators nominated and controlled by the Government.

But these Raiffeisen banks are not the only active agricultural credit establishments in Alsace and Lorraine. Owing to special circumstances the government of Alsace and Lorraine tried, some thirteen years ago, to compete with the Raiffeisen banks and deflect from them the clientele they had secured for themselves. It therefore set up a new institution, which however faithfully copied the organization of the Raiffeisen banks, similarly comprising two sections, one for inspection, advertisement and instruction, and one for banking, the investment of funds and trade. Thanks to government support the new institution soon prospered, yet did not lessen the importance of the Raiffeisen organization. It includes to-day 228 savings and loan banks, and some sixty miscellaneous associations, such as dairies, breeders' unions, etc. According to its balance-sheet for 1917, it has collected \$5,200,000, which are centralized in Strassburg and invested in Alsace-Lorraine in loans to communes or in moveable property.

Such are the two institutions responsible for ensuring agricultural credit to Alsace and Lorraine. They are, as has been seen, based on the same principle, that of establishing in rural communes savings and loan banks in the form of unlimited liability societies, and of depositing in central banks funds which are not utilized, in order that they may be invested and bear interest. The difference between the rate of interest received and that paid allows the rural banks to build up gradually small individual endowments.

FARM MORTGAGE INVESTMENTS OF LIFE INSURANCE COMPANIES IN THE UNITED STATES

The percentage of the total assets of life insurance companies invested in farm loans is not shown in the official statistics as they group together city loans and farm loans, but original statistics contributed by the companies show that from December 31st, 1914, to December 31st, 1916, they increased their farm mortgage investments from \$655,000,000 to \$845,000,000 and that on December 31st, 1918, they held more than \$1,000,000,000 of such mortgages. The increase during 1917 and 1918 would have been greater if the companies had not subscribed so largely to government loans.

One hundred and fifty companies furnished particulars of their farm mortgages, by States. These companies hold about 94

per cent. of all such loans made by American life insurance companies, distributed as follows:

New England States.....	\$ 32,000
Middle Atlantic States.....	955,000
Central Northern States.....	143,280,000
South Atlantic States.....	29,735,000
Gulf and Mississippi Valley States.....	37,444,000
Southwestern States.....	264,977,000
Northwestern States.....	446,324,000
Pacific States.....	26,638,297

One company, which has been in operation for 52 years, has made 104,331 loans to farmers, amounting to \$222,811,111, secured by mortgages on 15,475,790 acres—an

average loan of \$2,135.62 per borrower and \$14.40 per acre. The company acquired 1,073 pieces of land through foreclosure of mortgages; 1,047 pieces had been sold and there were 26 pieces still on hand at the end of 1918. The total losses on farm loans were \$179,639, or slightly more than one-tenth of one per cent.

The tendency to increase the duration of farm loans is illustrated by the experience of the same company. Originally it made farm loans for one, three or five years; then five years; and as the majority of five-year loans were renewed, it then made them for ten years; since July 1915 it has made them for twenty years, the principal to be repaid by amortization.

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in any of the articles in this list may obtain the original bulletin on application to the Institute Branch, so long as the supply for distribution is not exhausted.

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AGRICULTURAL STATISTICS

ACREAGE OF WINTER WHEAT AND RYE

Countries	Wheat.			Rye		
	1919-20	1918-19	Average 1913-14 to 1917-18	1919-20	1918-19	Average 1913-14 to 1917-18
	Acres	Acres	Acres	Acres	Acres	Acres
Belgium.....	353,000	328,000		531,000	496,000	
Spain.....	10,052,000	10,383,000	10,085,000	1,920,000	1,807,000	1,835,000
France.....	11,371,000	10,985,000	12,703,000	1,960,000	1,810,000	2,170,000
Scotland.....	70,000	77,000	68,000			
Roumania.....	1,891,000	2,941,000	4,715,000	158,000	219,000	204,000
Bessarabia.....	406,000	905,000	1,260,000	130,000	403,000	442,000
Canada.....	740,000	673,000	811,000			
United States.....	34,165,000	49,905,000	34,196,000	5,530,000	7,232,000	3,919,000
India.....	28,922,000	23,809,000	31,930,000			
Japan.....	1,325,000	1,362,000	1,250,000			
Tunis.....	1,384,000	1,189,000	1,332,000			

CROP REPORT FROM THE INSTITUTE

In a cablegram from the Institute it is reported that the 1920 wheat crop of India is estimated at 364,900,000 bushels compared with 280,000,000 last year and the average of the five years 1914-18 of 346,000,000

bushels. The maize crop of Argentina is estimated at 258,692,000 bushels compared with 224,000,000 last year and a five years' average of 196,000,000 bushels.

FOREIGN CROP CONDITIONS

(FROM BROOMHALL'S CORN TRADE NEWS)

United Kingdom.—The weather was very wet in April and seeding was delayed on account of sodden ground. Early in May there was promise of improved conditions, but a period of fine, warm weather was much desired. Complaints were received of wheat fields losing colour.

France.—April was very wet and field work considerably hindered, but spring sowings were practically completed at the end of April. Reports early in May spoke favourably of the standing crops. The areas planted are believed to be larger than previously recorded.

Belgium.—Spring Seeding was hindered by wet weather in April. Early in May the crops were of good promise.

Sweden.—Winter cereals were looking well after a more than usually mild winter.

Spain.—At the end of April crop conditions were good but a large production of wheat was not expected owing to decreased acreage.

Italy.—Early in May the weather was early and warm and there were favourable reports of crop conditions.

Germany.—At the end of April favourable weather was reported and good crops with an early harvest expected. The official report for April was favourable and showed the condition of wheat and rye as over average. The effects of lack of fertilizers will not be known until after the crops are threshed.

North Africa.—The crops were doing well at the end of April but there may not be much wheat for export for the early drought damaged part of the Tunis crop beyond repair, whilst Algeria has been swept bare of supplies and Morocco is actually importing.

India.—Favourable reports of the harvest were received early in May. A special official report gives the acreage of the 1920 harvest as 29,000,000 acres, compared with the former official report of 27,500,000 acres.

South Africa.—April reports of the maize crops were fairly good.

Argentina.—The weather was fine and favourable for gathering the new maize crop and for sowing wheat, flaxseed and oats. An increased acreage was expected.

Australia.—At the end of April the big drought was reported as thoroughly broken.

UNITED STATES MAY CROP REPORT

According to the report issued by the United States Department of Agriculture the condition of winter wheat in the United States on May 1st was 79.1 of a normal compared with 75.6 on April 1st this year, 100.5 on May 1st last year, and 87.1 the ten year May 1st average. The area remaining to be harvested is 34,165,000 acres or 11.9

per cent less than planted last fall. The area harvested in 1919 was 49,905,000 acres.

The production of winter wheat as estimated on May 1st is forecasted at 484,647,000 bushels compared with 731,636,000 harvested in 1919, 565,099,000 in 1918 and the average of the five years 1913-17 of 555,190,000 bushels.

AUSTRALIA'S WHEAT HARVEST

The latest official estimates of the harvest unfortunately confirm the gloomy prediction of two months ago. The official indication of the present harvest compares with the actual production for previous years as follows:

State	1917-18 bushels	1918-19 bushels	1919-20 bushels
New South Wales . . .	37,843,930	17,832,910	4,494,000
Victoria	37,737,552	25,329,871	13,578,134
South Australia . .	28,692,594	21,302,459	15,250,756
West Australia . . .	9,303,787	8,845,387	12,456,571
Queensland	1,035,268	104,509	150,000
Tasmania	252,383	278,839	141,000
Commonwealth	114,733,584	75,230,388	46,070,455

Australia's record crop was 179,000,000 bushels in 1915-16.

The Commonwealth Statistician, on a ten-year average, estimates the requirements for home consumption and seed at approximately 34,500,000 bushels, so that after all there will be, on paper, a small exportable surplus of 11,500,000 bushels available. Stocks of old wheat on hand in Australia on December 1st were 76,500,000 bushels. Allowing for this year's home requirements, seed, and losses through weevil, mice and weather, the total exportable surplus for the year should be about 84,000,000 bushels, and of this there has been shipped from December 1st to January 17th, 11,717,469 bushels of wheat and 32,464 tons of flour—an equivalent of 13,340,669 bushels.

IMPORTS OF ANIMAL PRODUCTS INTO THE UNITED KINGDOM IN 1919

(THE JOURNAL OF THE MINISTRY OF AGRICULTURE, MARCH, 1920)

The year 1919 may be regarded as transitional between the close of the war conditions and the resettlement of trade on a peace foundation. Foreign and colonial markets are once more opening wider their doors to the British purchaser, and in the matter of food supplies the British farmer is again confronted with the prospect of increased competition from overseas. The returns relating to the agricultural imports and exports of the United Kingdom for the year 1919 contained in the Trade and Navigation Accounts recently issued by the Board of Trade show the extent to which this trade has so far been able to recover as a result of the cessation of hostilities. The returns cannot, of course, be taken to represent the first year's working of trade under normal peace conditions. Trade restrictions and the enforcement of the German Blockade continued to some extent during the year, while as a special relief measure the Allied Governments made provisions for supplies of

food to be sent to meet the needs of starving Europe, which in times of more settled harvests might compete freely in international trading.

The value of the imports into the United Kingdom during 1919 increased 6.6 per cent. on the previous year, and 111.3 per cent. on 1913. While the figures for 1919 as to quantity may be said generally to show an increase over those for 1918, in a number of the main articles of import the increase is very small, while others show an appreciable decrease. Of the principal agricultural commodities, the imports in the total quantity of meat only increased 1.3 per cent; wheat and barley increased respectively 23.3 and 231.2 per cent; while oats decreased 38.9 per cent. Butter and cheese show slight decreases, but eggs increased substantially.

The details of the imports of meat for the years 1919, 1918 and 1913 are shown in the following table:

Description	Quantities		
	1919	1918	1913
	cwt.	cwt.	cwt.
Beef, fresh and refrigerated.....	6,492,120	7,588,784	9,203,310
Beef, salted.....	- 68,990	14,682	49,834
Mutton, fresh and refrigerated.....	4,074,956	2,086,148	5,330,290
Pork, fresh and refrigerated.....	136,189	99,654	494,264
Pork, salted.....	24,065	11,691	240,597
Bacon.....	8,280,923	10,473,562	4,857,890
Hams.....	1,813,376	1,554,943	854,995
Meats, unenumerated, fresh and refrigerated.....	1,121,880	690,620	728,329
Meat, preserved.....	15,512	2,623	104,138
Salted.....	3,261,749	2,188,650	889,005
Rabbits.....	271,339	516,542	525,578
	25,561,099	25,227,899	23,278,230
Poultry:	Number	Number	Number
Alive.....	619	101	858,979
Dead.....	cwt.	cwt.	cwt.
	147,567	34,792	278,465

Beef.—No fresh beef has been imported since 1917.

Chilled beef was imported in 1919 to the quantity of 125,504 cwt., as against 163,959 cwt. in the previous year, and 5,248,004 cwt. in 1913. The Argentine (123,804 cwt.) and Uruguay (1,700 cwt.) were the only countries of import; the respective figures for these countries in 1913 were 5,216,022 cwt. and 31,982 cwt., when they also between them supplied the whole of the chilled beef imported.

With regard to imports of frozen beef, imports decreased from 7,424, 825 cwt. in

1918 to 6,366,616 cwt. in 1919. The quantity of frozen beef imported during 1913 was 3,952,880 cwt. The countries whence the beef was consigned were as follows:

	1919
	cwt.
Argentina.....	3,743,914
United States.....	856,170
Australia.....	622,307
New Zealand.....	424,735
Uruguay.....	307,284

The imports from the Argentine have doubled, while those from the United States have decreased by 76 per cent. It may be remarked that in 1913 the Argentine sent us half of our imports of frozen beef, and Australia one third; the quantity received from the United States was inappreciable.

Mutton.—No fresh or chilled mutton has been imported during the last two years. The imports of frozen mutton rose from 2,086,148 cwt. in 1918 to 4,074,956 cwt. in 1919, or nearly 100 per cent; the pre-war figure (1913) was 5,204,357 cwt. Thus the return of peace conditions has shown a rapid recovery in imports, approaching to the quantity received before the war.

Our supplies were received mainly from New Zealand, the Argentine, and Australia, which in 1913 were also the principal countries of import.

Pork.—No fresh or chilled pork has been imported during the last three years.

Frozen pork was imported in 1913 to the quantity of 15,707 cwt. and salted pork, 240,597 cwt. It should be mentioned, also, that in pre-war years Great Britain imported a considerable quantity of fresh pork, chiefly from the Netherlands, the total for 1913 being 478,557 cwt. America exported to us the bulk of our supplies of frozen and salted pork, although before the war Denmark was,

in the latter commodity, by far our principal supplier. During the past few years, however, no imports were obtained from that country.

Bacon, Hams.—It will be seen from the above table that the figures for bacon and hams show a considerable increase over those for 1913.

The bulk of our supplies, both of bacon and hams, came from the United States. In regard to bacon, out of the 8,280,923 cwt. imported, the United States consigned 5,893,514 cwt. and Canada 2,094,248 cwt.; Denmark, which in 1913 sent us nearly half our supplies, during the past two years has exported to the United Kingdom an almost negligible quantity. While the importation of hams has increased so considerably, there has been little change in the markets of supply, the United States, as always, having sent us by far the largest quantity, with Canada as the only other country of any importance in this trade.

Rabbits.—271,339 cwt. of dead rabbits were imported during 1919, of which 270,491 cwt. were frozen, and 848 cwt. fresh. In the previous year the quantity was 516,542 cwt., all of it frozen. The pre-war figure (1913) was 481,964 cwt. frozen, and 43,614 cwt. fresh. Practically the whole of our supplies of frozen rabbits, as before the war, was received from Australia.

Imports of Dairy Produce, Margarine and Eggs

Description.	Quantities.		
	1919	1918	1913
	cwt.	cwt.	cwt.
Butter.....	1,558,172	1,578,658	4,139,028
Margarine.....	459,369	301,650	1,518,297
Cheese.....	2,124,715	2,357,103	2,297,340
Milk, condensed—			
Unsweetened.....	1,033,385	900,696	50,008
Sweetened.....	2,150,535	1,666,994	1,202,207
	Great	Great	Great
	hundreds	hundreds	hundreds
Eggs.....	5,644,395	2,656,415	21,579,950

Butter.—The figures in the above table show a practically stationary import trade, both in quantity and value, for the years 1919 and 1918, though a big drop on the pre-war figures. It is noteworthy that the bulk of the produce came from distant parts of the world, 318,872 cwt. being declared from New Zealand, 267,765 cwt. from the Argentine, 216,495 cwt. from the United States and 214,689 cwt. from Victoria. Denmark, which before the war was by far our principal country of import, sending us in 1913 no less than 1,706,759 cwt. (or more than the total quantity imported in 1919) only exported 290,291 cwt., a considerable increase, however, on the 1918 figure of 40,327 cwt. Russia exported 6,954 cwt. as against none in 1918

and 1917, but 751,414 cwt. in 1913, when she was the second largest country of import in this commodity.

Cheese.—The quantities of cheese imported recorded in the table above show very little drop as a result of war conditions, although in regard to value there is an increase of 116 per cent between 1913 and 1919.

There was considerable change in the countries whence we receive our supplies. The New Zealand trade increased from 547,182 cwt. to 1,239,553 cwt., while a decrease from 1,293,768 cwt. to 647,212 cwt. is to be noted in the case of Canada, and from 22,449 cwt. to 19,856 cwt. in the case of the United States. The Netherlands figures show a decrease

from 291,895 cwt. to 79,217 cwt. It may be stated that before the war Canada was easily the leading country of import, supplying us with more than half of our total imports, New Zealand being second and the Netherlands third.

Eggs.—The number of eggs imported during 1919 was 5,644,395 great hundreds, as against 2,656,415 great hundreds in 1918 and 21,579,950 great hundreds in 1913. The figures show that the importation of eggs, which decreased very considerably as a result of war conditions, has shown a marked increase during the past year, although it is still a great deal below the pre-war quantity, while the cost to the British purchaser has not decreased to any very appreciable extent. The marked fall in our imports of eggs is

perhaps due chiefly to the fact that Russia during the past two years has dropped entirely out of the trade. This fact will be better appreciated when it is pointed out that in 1913 Russia sent us nearly 11,453,277 great hundreds, or more than twice the number imported from all countries during 1919. A noticeable feature as regards the countries whence the eggs were consigned is the increase in the importation from North America, Canada exporting 1,476,962 great hundreds (388,985 great hundreds in 1918) and the United States 1,408,606 great hundreds (337,345 great hundreds in 1918). Denmark, however, is our principal supplier, sending us 1,638,067 great hundreds in 1919 as against 1,170,535 great hundreds in the previous year, but 4,265,000 great hundreds in 1913.

The school-directed home garden is the most economic form of gardening for small cities, towns and the suburban districts of large cities. The child's garden becomes a center of interest of the whole family. The food is produced at the home where it is to be used and the home is beautified. As the garden ties the child's interest to the home, the visits of inspection and instruction of the garden teachers tie the home to the school. In the congested sections of large cities, home gardens are not always possible and the community school grounds or vacant lot plot must be substituted. This form of school garden usually requires a greater financial cost in proportion to the value of the crop but is still justified from the standpoint of education.—Nature Study Review.

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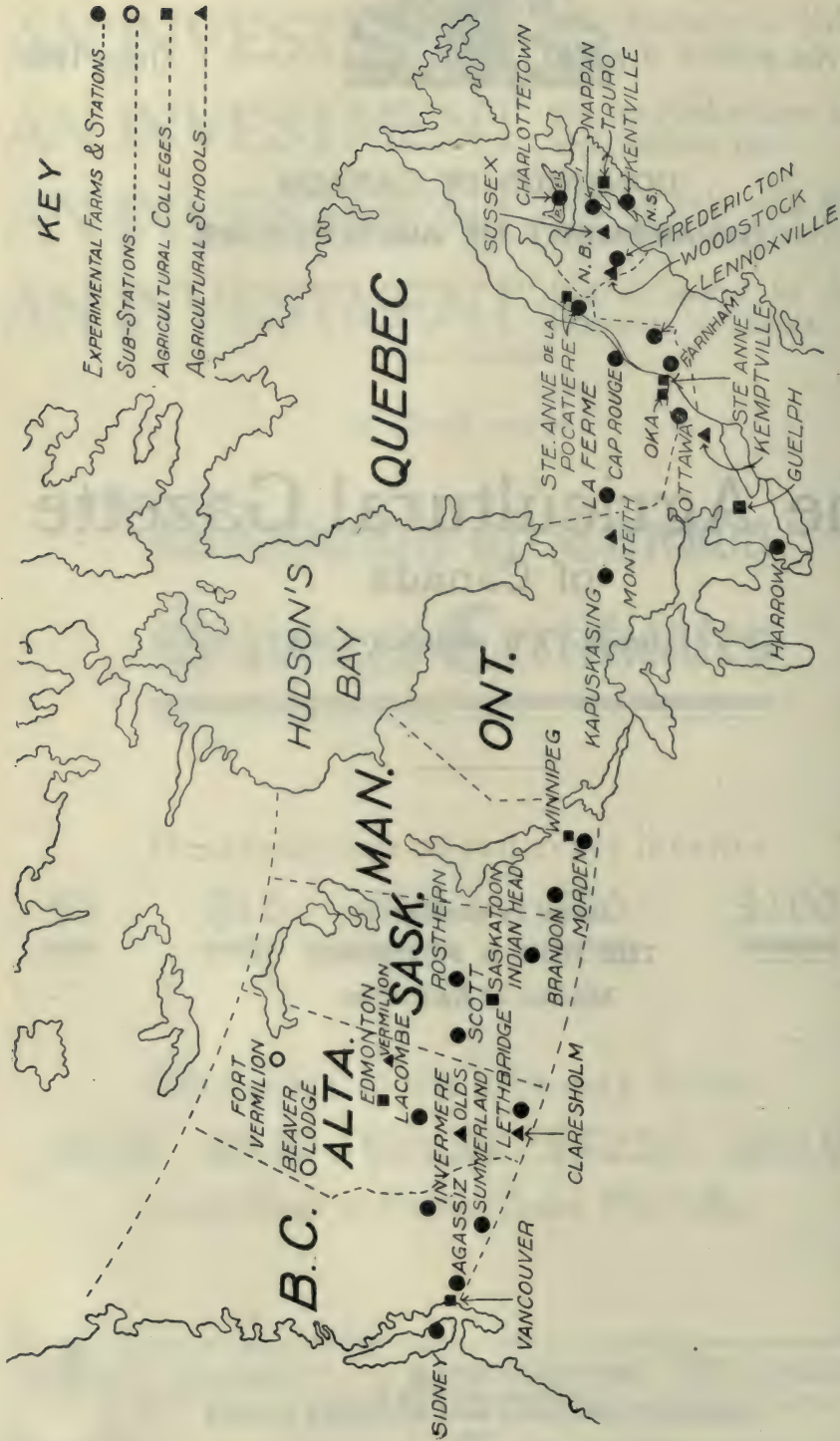
DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE

The Agricultural Gazette of Canada

EDITOR: J. B. SPENCER, B. S. A

Issued by direction of
THE HON S. F. TOLMIE
Minister of Agriculture

OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920



MAP OF CANADA SHOWING THE LOCATIONS OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

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TECHNICAL AGRICULTURE

AN outcome or aftermath of the world war is a period of evolution and development; it might be added also of strenuousness. For a nation to be in the van, in other words to be successful, it must be thorough, and to be thorough there must be deep delving. A former premier of this country said the twentieth century belonged to Canada. Four-fifths of a quarter of the century has well nigh gone, and nobody can say we have been standing still. Both in peace and in war, the Dominion has gained influence and has profited much. This has been attained, been accomplished, by watchfulness, by aggressiveness, by emulation, and by progressive study. More attention has been paid, for instance, to agriculture in the first and second decades of the century than in the previous fifty years. The conditions brought about by the war have emphasized this situation, at the same time making it more and more necessary that our efforts should be unceasing.

For the foregoing reasons the coming, the organization, of the Canadian Society of Technical Agriculturists is especially welcome. A vastly important and much-needed work stretches before it. The Experimental Farm System has achieved a great deal, far more than the people appreciate or realize, as the federal Minister of Agriculture suggested in his recent speech before Parliament on introducing his estimates. Various societies and organizations have also accomplished much, but much yet remains to be accomplished if we would keep in line with the most progressive nations of Europe and with our neighbours to the south. Science must be our handmaid in going forward, and Science demands perpetual investigation, continual research, and never-ending experiment. It also involves, as Professor Barton of Macdonald College and vice-president of the Society said at the inaugural meeting, organization, co-operation, and collaboration. It is to be hoped and expected that these will be forthcoming in no unstinted measure.

The objects directly aimed at by the Society are set forth in the extract from the constitution, which will be found on page 000 of this number of THE AGRICULTURAL GAZETTE of Canada, but briefly they may be stated as not only the advancement and encouragement of reasearch, but also of the development of more co-operation and co-ordination between the various Departments of Agriculture as well as between the colleges and educational institutions in which the basic industry of the country receives main or even partial attention.

THE GOVERNOR-GENERAL'S ADDRESS

AT the inaugural meeting of the Canadian Society of Technical Agriculturists held in Ottawa, June 2nd to 4th, a feature of the first day was a dinner session at which the Governor General was good enough to deliver an address. In his introductory speech, Dr. Klink of British Columbia, president of the Society, referred to the fact that His Excellency was a practical and a scientific agriculturist, who took a deep interest in the Royal Society of Canada and was Chancellor of the University of Leeds. His Excellency's address follows:

His Excellency, the Duke of Devonshire, Governor General of Canada, said:

Mr. Chairman and Gentlemen:

You, Sir, remind me that I have taken considerable interest in the work of agriculture, and you also remind this audience that I take considerable interest in the work of the Royal Society of Canada. I think it is a happy omen that only a few weeks ago, in this very room, I had the pleasure of addressing a number of gentlemen connected with the Royal Society in Canada, and it is extremely satisfactory to note the keenness and wholehearted desire which there is throughout the whole Dominion of Canada to make the very best use we can of the practical application of science to the needs and requirements of the country as we know it.

You are indeed to be congratulated on the very successful inauguration of this movement of which we see the efforts to-day. The work you are doing, I know, will be of very material assistance, not only in the solution of those problems which may confront us from day to day, but it will also open up those avenues which future generations will be able to still further develop. It may be of interest to know that in the Old Country, from which I returned about three weeks ago, conditions there are

distinctly favourable, and great and keen as the interest has been in agriculture, it is safe to say that it never was on a sounder basis than it is in that country to-day. The forthcoming meeting of the Royal Agricultural Society which is to be held at Darlington in a few weeks' time, promises to be one of the most successful in the annals of that society, both in the quality and quantity of interest; they expect to have almost a record show. I am quite well assured that in spite of the many difficulties and drawbacks which we had to contend with, in consequence of war conditions, never has British stock been in such condition as it is to-day. It reflects the greatest credit on all concerned, that even in these very difficult and trying times, although possibly the numbers may have diminished, the quality has not.

"PRACTICE OF SCIENCE"

It might be useful for us to remember that in connection with an organization such as you are engaged in here to-day, the motto of the Royal Agricultural Society is "Practice of Science", and the foundation which was laid between 70 and 80 years ago has been followed, and that society is doing more extensive work every year than it did before.

We have in this Dominion vast opportunities, and we have seen by practical results what has been achieved by the application of scientific methods, and the study of scientific processes, to the natural qualities of the soil and the climate, and we have seen the very remarkable results that have been attained in a comparatively short time. It is a great satisfaction to all of us who are engaged in agriculture that there will always be necessarily the need and desire for what we are capable of producing. After all, agriculture is the first necessity of human existence, either in

food or in clothing, and it is for us to see that the very best which we can produce shall be produced.

“A BENEFICIAL FUTURE”

To-day we are confronted with a problem of an infinitely more varied and far-reaching character than ever confronted us before. In the very interesting agenda paper which I read, I see you are going to discuss a vast number of varied subjects. The work which you are doing will, I know, be of great benefit. We have to remember at this moment that in consequence of the war, a considerable area of the world which used to produce food products is incapable of doing so, and it is bound to be a good many years before that production can be raised to anything

like pre-war standards. We, in Canada, I believe, are in a position to take the fullest advantage of that world-wide condition, and by steadily keeping the great object in view, and by keeping science and practice closely hand-in-hand, I am quite confident the Dominion will achieve greater results than ever before.

I can assure you it is a great pleasure for me to be able to say a few words to you to-night, and to congratulate you most sincerely on the formation of this organization. I wish it every success. You have made an admirable election to start, and I know you will contribute not only to the sum of knowledge in the immediate future, but many generations will be grateful for the work you are doing. I again congratulate you on the work which you have achieved.

The dissemination of agricultural information by means of the printed page, and more especially by means of the formal bulletin and report, has evident weaknesses, but perhaps it is not always fully realized to what a great extent the mature results of the work of the Department of Agriculture and the experiment stations disseminated by this means have actually been embodied in the permanent literature of agriculture, incorporated in common thought, and applied, consciously or unconsciously, in agricultural practice.—*Experiment Station Record*.

PART I

Dominion Department of Agriculture

EXPERIMENTAL FARMS

IRRIGATION EXPERIMENT AT OTTAWA

BY D. D. GRAY, FARM SUPERINTENDENT

CONSIDERABLE interest is being taken in the irrigation experiment now under way at the Central Experimental Farm, Ottawa. The test is being conducted on a piece of land about three and a half acres in area just east of the Rideau canal at Hartwell's Locks. This is practically the first irrigation test conducted for the benefit of Eastern Canada, all the Government irrigation schemes up to the present having been worked out in the West.

The water is conducted through a wooden flume from the spillway overflow at the locks to the site of the experiment. Here it is directed in the ordinary manner employed in the large systems in the west.

The field under test is divided into two equal sections and each section

is planted to equal amounts of field corn and Swede turnips. One section will be irrigated while the other section will not. Thus it will be possible at the same time to make a comparative study of the value of irrigation over non-irrigation with two crops instead of one.

The result of this experiment on a small scale will to a certain extent decide whether irrigation projects will be developed in other parts of Eastern Canada. There are a number of sections where intensive cultivation can be engaged in and irrigation employed to advantage if this experiment warrants the initial expenditure. Observations will be made throughout the growing season and when the crops are harvested a comparative report will be prepared.

DIVISION OF POULTRY

BENEFIT FROM EGG-LAYING CONTEST

BY F. C. ELFORD, DOMINION POULTRY HUSBANDMAN

AN indication of the value of egg-laying contests is seen in a recent sale of the leading pen of birds in the Canadian Egg-laying contest at the Experimental Farm, Ottawa. This pen has led consistently throughout the first half of the contest, and as a result the birds, which would, under ordinary conditions, be selling at about three dollars each, have actually been sold for more than nine times that amount.

The original owner of the pen was Mr. J. E. Rhoades and the new owner is Dr. S. Lafortune, President of the Quebec Provincial Poultry Association. In addition to his official position in the Quebec association the Doctor is the Quebec representative in the National Poultry Council. The poultrymen of Quebec have been greatly encouraged by his successes and have benefitted by his enthusiastic co-operation with them.

For a number of years we have had exhibitions and fairs drawing attention to the importance of type and feather in fowls, but it has taken the egg-laying contest to emphasize the production side of the business. As a matter of fact, the pen which has led from the beginning is not one of exceptional ability, although it is of

decidedly good quality. Thus its producing ability, as brought out by the egg-laying contest, has given it the enhanced value. It is safe to assume that the egg-laying contest will tend to do for the utility fowl what the Record of Merit and Record of Performance has done for the dairy breeds of cattle.

RULES AND REGULATIONS GOVERNING EGG-LAYING CONTEST

THE new rules and regulations given herewith, which govern the Dominion egg-laying contest for the year commencing November 1st, 1920, differ in some respects to the rules used in the contest now in progress:

RULES AND REGULATIONS

1. *Number.*—Each entry or pen shall consist of 10 birds of a standard variety and each bird must be typical of the breed and free from standard disqualifications.

2. *Substitution.*—Each contestant will be allowed to keep his pen of 10 birds up to strength throughout the contest. In the Canadian contest two reserves intended as substitutes must accompany the original birds and will be housed with them in the pen. The 10 birds for the original pen must be specified before the contest begins. Further substitution will be allowed as deaths occur. In the Provincial Contests substitutes will be accepted when deaths occur.

3. *Acceptance of Entries.*—As the accommodation at each contest is limited, the acceptance of the pens will be influenced by:

1. Whether the entrant breeds the pen entered or not.
2. The number of birds of the same strain kept by the owner.
3. The inspector's report of the flock.
4. The time of application.

4. *Inspection.*—Pens for which application have been received will be inspected between August 15 and September 30, and those that may be among diseased flocks or in unsanitary conditions will be rejected, and those that do not promise to be mature or those that may mature too early may be rejected.

5. *Declaration of Health.*—Each entry of a pen, and each additional entry of a male or female, must be accompanied by a declaration stating that the birds or bird come from a flock that has not been affected with chicken-pox or tuberculosis for at least three months previous.

6. *Banding.*—The birds may be banded by the owner with his own bands before shipment, but will be rebanded with sealed contest bands upon arrival at the contest and the original bands removed. The contest numbers corresponding to owners, numbers will be supplied him.

7. *Delivery.*—The birds must be delivered at the contest when notified by the management, express prepaid. This will be from the 15th to the end of October. Address the shipping crate plainly with the address of the contest as given in the announcement, and on each crate put your own address, which must be the same as the address under which the application was made.

8. *Rejection.*—The management reserves the right to refuse any entries, to reject or return to the owner, or destroy birds suffering from contagious or infectious disease, or are in any way unsuitable for the contest, to clip the wings of any bird that may be troublesome, to reject all birds that show impurity of breeding or standard disqualifications, and to return to the owner pens from which eggs have not been received by December 15.

9. *Breeding.*—The owner will be allowed to send after February 15, a suitable male to mate with his pen, and all eggs from a mated pen from March 1 to May 1 will be shipped to the owner or to any other single address which the owner may designate. The eggs will be shipped once a week in bulk and only to the one address throughout the two months. All eggs collected that are not cracked or broken will be included in these shipments. As the mating of the pens is optional, it will be noted that in cost of production awards, a proportionate reduction of feed will be made in the pens having a male bird.

10. *Price.*—Eggs so shipped will be charged for at ten cents an egg and will be shipped, express collect. A bill will accompany each shipment which must be paid and the empty package returned before the next shipment will be forwarded.

11. *Feeding and Housing.*—The birds while in the contest will receive the best of feed and care, and the system of feeding will be mixed

grain in litter morning and evening, and dry mash in a hopper before them all the time. Green feed, grit, shell and beefscrap or green bone will also be supplied. They will be kept in houses having glass and cotton fronts.

12. *Eggs Counted.*—The contest shall be decided by the total number of marketable eggs laid by each pen. Exceedingly bad shaped eggs, soft shelled eggs or eggs weighing less than 20 ounces to the dozen will not be given official credit.

13. *Disposal of Eggs.*—All eggs laid during the contest become the property of the Department of Agriculture, and those not shipped as breeding eggs will be sold at market prices.

14. *Reports.*—A report of the trap-nest weekly record of each bird and weekly and total record of each pen will be issued at the close of each week. Copies of this report along with a monthly summary will be sent to each contestant and to all papers that will publish them.

15. *The Return of the Birds.*—If no notification as to the return of the birds has been received by October 1, 1921, the birds on the completion of the contest will be sent by express collect, to the owner's address from which the shipment was made. Should any of the pens not be laying towards the close of the contest, and not likely to lay before the end, they will be returned earlier so as to make room for birds entering for the next contest.

16. *Sale or Transfer.*—No recognition of sale or transfer of birds during the contest will be made nor shall any entry be withdrawn during the contest, except for reasons stated above.

17. *Record of Performance.*—All birds in the contests not otherwise disqualified and whose eggs average 24 ounces to the dozen, that in 52 consecutive weeks lay 150 eggs, will receive certificate of Record of Performance AA, and those that lay 225 eggs will receive certificate of Advanced Record of Performance AA.

18. *Responsibility.*—While every precaution will be taken, neither the management nor any official of the contest will be held responsible should loss occur.

19. *Final Decision.*—In all cases, the decision of the management shall be final.

Two very important changes are to be seen in the rules and regulations presented above. They differ from any previous ones either here or elsewhere in the following respects:—First: All pens which are entered will be officially inspected before

they are received, for two reasons, (a) To make sure that the birds are in a healthy condition. None from unsanitary pens or questionable quarters will be accepted; (b) To make certain that the birds will be in the best condition when they arrive. This will mean that birds not sufficiently mature or those which have passed maturity will be eliminated. Second: Another change or rather an innovation is that all pens entered in the contest may, at the discretion of the owner, be bred during the whole breeding season. The owner will provide his own male bird and will be allowed to purchase every egg laid in his pen during the breeding season at 10c. per egg plus transportation. The reason behind this is a two-fold one. There are, roughly speaking, over two thousand laying hens at the various contests throughout the Dominion. These birds are probably the best bred-to-lay birds in Canada along with some from other countries. It is believed that the national loss would be too great if these birds were not bred during the laying season. Furthermore one year's progeny from these high producing birds will be saved to their owners if they are allowed to be bred.

The second series of Egg-Laying Contests beginning November 1, 1920 will continue for 52 consecutive weeks. The names and locations of the contests will be as follows:—

CANADIAN CONTEST

Canadian Egg-Laying Contest,
Experimental Farm, Ottawa, Ont.

PROVINCIAL CONTESTS

Prince Edward Island Egg-Laying Contest,
Experimental Station, Charlottetown,
P.E.I.

Nova Scotia Federal Egg-Laying Contest,
Experimental Farm, Nappan, N.S.

New Brunswick Egg-Laying Contest,
Experimental Station, Fredericton, N.B.

Quebec Egg-Laying Contest,
Experimental Station, Cap Rouge, Que.

Ontario Egg-Laying Contest,
Experimental Farm, Ottawa, Ont.

Manitoba Egg-Laying Contest,
Experimental Farm, Brandon, Man.

Saskatchewan Egg-Laying Contest,
Experimental Farm, Indian Head, Sask.

Alberta Egg-Laying Contest,
Experimental Station, Lethbridge, Alta.

British Columbia Egg-Laying Contest,
Experimental Farm, Agassiz, B.C.

The "Canadian" is open to entries from anywhere, the "Provincial" is confined to entries within the province in which it is situated.

DAY-OLD CHICKS

BY F. C. ELFORD, DOMINION POULTRY HUSBANDMAN

FOR the past two or three years we have endeavoured to raise more chicks on the various Experimental Farms throughout the Dominion than was needed on the local Farm so as to have day-old chicks for sale to inquiring parties.

The demand for day-old chicks has not been filled by any means and the few we have hatched have only been a drop in the bucket, and in order to help supply this want to greater extent we put in at a number of the Stations Mammoth incubators, with the results that this year we were able to supply, though still in limited quantities, day-old chicks from more of the Branch Farms.

We do not carry on any custom hatching operations. We attempted this some years ago but it was not very successful, in that so many eggs of uncertain fertility were brought in for incubation, that the hatches were more or less unsatisfactory, so that

as far as the Experimental Farm is concerned the supplying of day-old chicks is much more satisfactory than custom hatching, both to the Farm and to the people who wish the chicks.

There is no doubt that there is a considerable future for the day-old chick business and the customers are not confined to back-yard poultry people, for farmers as well as other classes are getting into the habit of purchasing their day-old chicks rather than breeding their own or even buying the eggs and setting them.

Chicks can be shipped considerable distances if proper care is taken in their shipment. We find, however, that a journey which requires more than forty-eight hours on the train is more or less risky, but good strong chicks, taken out of the incubator, put into well ventilated shipping boxes and shipped before they are fed, should carry forty-eight hours and arrive in good condition.

THE DIVISION OF BOTANY

MOSAIC DISEASE IN POTATOES

THERE are in New Brunswick certain counties which are badly infested with mosaic disease of potatoes. In the counties where the disease exists growers are finding it impossible to produce even average yields, as mosaic reduces the crop in many cases by about 40 per cent. The growers are naturally anxious to find some means of solving

their present difficulty, but so far they have been unsuccessful.

This spring the Division of Botany of the Dominion Experimental Farms system has taken the matter in hand, and is conducting an experiment in one of the counties where mosaic disease has been giving the most trouble. This experiment is being carefully conducted by competent

men who are endeavouring to produce satisfactory crops under the ordinary field conditions, cultivation and fertilization being the same as in the ordinary potato fields. The object of the experiment is to ascertain if potatoes, from seed grown in disease free areas, can be grown in the fields where the disease exists, without diminishing the yield of the first year's crop. On completing the first year's work a further test will be conducted, with a view to learning if potatoes from disease-free seed grown on the soil in which disease has previously existed will continue to produce maximum crops in the second generation, or whether the seed should be changed annually.

For the test five bushels of northern grown Ontario seed of Green Mountain potatoes, from a field producing over one thousand bushels per acre, were secured, which will be compared with local grown Green Mountain potatoes in the disease

infested counties. These potatoes will be planted side by side in a potato field, each lot occupying one third of an acre. The results of this year's test will indicate whether the planting of disease-free seed in contaminated soil will produce a maximum crop.

New Brunswick has earned an enviable reputation for the quality and yields of her seed potatoes, and the fact that mosaic exists in some counties is by no means a slur on the province as a whole. It is well known that certain sections of other provinces are affected with mosaic disease, while other parts are absolutely free; for example, many of the southern counties of Ontario are finding it almost impossible to produce good crops owing to the ravages of disease, while the northern districts, which are still clean, are producing potatoes for export to the southern counties and to other parts of Canada.

EXTENSION AND PUBLICITY DIVISION

EXHIBIT FOR WESTERN FAIRS

AN exhibit representing the activities of the various branches of the Dominion Experimental Farms has been prepared by the Extension and Publicity Division and is now being shown in Alberta, Saskatchewan, and Manitoba.

This exhibit, comprising materials contributed by the Cereal, Live Stock, Poultry, Horticulture, Entomology, Botany, and Agronomy divisions will be shown at Calgary, Edmonton, Saskatoon, Regina, and Brandon. W. C. Hopper, B.S.A. is in charge, assisted by W. E. Meldrum.

The contribution from the Cereal Division consists of sheaves and threshed grains, both old and tried varieties of merit and new varieties which give promise of good results in the western provinces being in-

cluded. These new varieties were either originated or have been improved at the Experimental Farms.

In the live stock department are models of barns, hog cabins, straw shelters, feed racks, etc. An interesting model is that of a typical barn, suitable for the western Canada farm, with modern equipment, including electric lights. Free plans of the buildings and equipment which these models represent are supplied to interested farmers visiting the exhibitions. In addition, plans of trap nests, hoppers, and poultry houses suitable for the West, models of which are included in the exhibit, are also given to interested applicants. A panel emphasizing the egg production side of the poultry industry is being featured. In the past, form, type, and conformation were

given prominence in a poultry exhibit, but this year, due largely to the interest taken in the egg-laying contests, egg production takes priority.

In the agronomy section there is a panel showing how windbreaks prevent soil drifting. It is claimed that for every foot in height of a windbreak the soil is protected from drifting for a distance of fifty feet. This fact is of great importance on the prairies, especially in those sections where drifting problems occupy the attention of farmers.

The western farmers are keenly interested in insect pests after the experience of last year; therefore, remedies for the control of cutworms and locusts are given prominence in the entomological section.

The part of the exhibit dealing with smuts, rusts, plant diseases, etc., has been prepared by Mr. W. P. Fraser, who is in charge of the Dominion Laboratory at Saskatoon, Sask. His contribution consists mainly of specimens of diseased

grains, and plants of economic importance in the Prairie Provinces.

Considerable use is made of coloured, transparent photographs electrically illuminated. By means of these photographs it is possible to convey information which cannot be given by the use of models or literature. These panels include photographs showing the western rye and alfalfa mixtures and other forage plants, and also sunflowers, which are now used as a silage crop; in fact, photographs of practically every branch of agriculture are included in the exhibit and, besides making an excellent display, are of great value as an educational medium.

A number of the local branch farms in the West have prepared additional exhibits intended to supplement the main exhibit. The farms at Lethbridge, Lacombe, Scott, Indian Head, and Brandon have taken an active part in this work.

CEREAL DIVISION

ASSISTANT SUPERINTENDENT FOR CHARLOTTETOWN FARM

AN assistant superintendent for the Experimental Farm at Charlottetown, P.E.I., has recently been appointed. The new officer is B. F. Tinney, B.S.A. one of this year's graduates of the Ontario Agricultural College. Mr. Tinney has already occupied the position of temporary assistant at

the Charlottetown Farm for two years and is familiar with the work. He is at present engaged in investigations in the cereal division at the Central Experimental Farm, Ottawa, where, under Dr. C. E. Saunders, he is receiving first hand instruction in the work he will take up on the Prince Edward Island Farm.

DAIRY AND COLD STORAGE BRANCH

RESIGNATIONS

THE resignation of Mr. W. W. Moore, Chief, Markets Division in this branch, who left the Service on May 31, is very much regretted by those who have been associated with him. Mr. Moore was connected with the Department

for over 25 years and through his natural ability and application he had become a very useful and valuable officer. For many years he had charge of the details of the cargo inspection and the refrigerator car inspection services and the collection

of general market intelligence relating to dairy produce and other perishable foods. The Weekly Dairy Market Report and the Monthly News Letter issued during the past year have also been compiled by the Markets Division.

Mr. Jos. Burgess, Chief Cold Storage Inspector, has also tendered his resignation, to take effect on July 31. Mr. Burgess, like Mr. Moore, is an old and tried officer of the branch having been in the Department of Agriculture for something like 23 years. During that period he has performed a variety of services, including the making of cheese and butter, the operation of refrigerated cheese curing rooms, inspection of cold storage ware-

houses, grading of butter and cheese, etc. Mr. Burgess' personal knowledge of the cold storage warehouses in Canada is unique, no other man in the country having had the same opportunity through travel and enquiry to gather this information.

Mr. Moore is now manager for the United Dairymen Co-operative Limited at Montreal, a selling organization for cheese factories in Eastern Ontario. Mr. Burgess has accepted a position with Hodgson, Rowson and Co. Limited, Cheese and Butter Exporters, Montreal. Their engagements by commercial firms may be taken as a compliment to the training and experience which they have received in the Dairy and Cold Storage Branch.

THE FRUIT BRANCH

VISIT OF CANADIAN FRUIT TRADE COMMISSIONER TO BRITAIN

BY C. W. BAXTER, COMMISSIONER

MR. J. FORSYTH SMITH, Canadian Fruit Trade Commissioner in Great Britain, who, since 1915, has devoted most of his time to promoting the interest of Canada's fruit industry in Great Britain, is now visiting the apple-growing sections of Canada. During the period when apples were not permitted to enter Great Britain, Mr. Smith acted as general trade Commissioner in the United Kingdom, and through the courtesy of the Department of Trade and Commerce in which he is employed, he has co-operated with the Fruit Branch of the Department of Agriculture.

Mr. Smith attends all apple sales in the Old Country during the shipping season and cables to the Fruit Branch prices and items of general interest to Canadians shipping fruit across the sea. This intelligence is published in the Fruit Branch Telegraphic Market Reports which are issued simultaneously to growers and dealers twice weekly from Middleton, N.S.,

Ottawa, Ont., Winnipeg, Man., and Vancouver, B.C., during the season when the movement of fruit is heavy, and once each week, from Ottawa only, during the balance of the season. In addition to the information from the British markets, these reports contain wholesale prices quoted at all large marketing centres in Canada.

Mr. Smith has acquired a thorough knowledge of trade conditions abroad. This is of great value to Canadian exporters, and before leaving for Canada, he visited Europe in order to learn conditions there and to ascertain the possibilities of extending the market for Canadian apples.

Arrangements are being made for the holding of meetings in the various apple-growing provinces in order that people interested in the export market may have an opportunity of obtaining first hand information from Mr. Smith. The dates and places of meetings will be announced through the agricultural press serving the localities in which the addresses will be given.

LIVE STOCK BRANCH

CONDEMNATION OF IMMATURE CALVES

BY P. E. LIGHT, B.S.A., MARKETS DIVISION

THE heavy annual loss to the live stock industry of Canada through the slaughtering of immature calves will be practically eliminated, the quality of the veal supply improved, and more humane conditions in calf marketings obtained, through the enforcement of the amendment to Regulation 26, under Section 9, subsection (A) of the Live Stock and Live Stock Products Act.

Under the amended regulation, which became effective May 25th last, all calves received at public stock yards and on packing house sidings are subject to inspection by the Department of Agriculture. Calves three weeks of age and

under, and other calves in an immature condition are being condemned. Condemned calves are being slaughtered at packing plants having the necessary salvaging conveniences, and the funds accruing from the salvage are being held by the Department, pending the effect of the Order.

It is expected that the strict enforcement of this regulation will speedily reduce unfit calf shipments to a negligible volume, especially when all parties concerned appreciate the constructive policy underlying the Order. The regulation is being administered by the Department of Agriculture through the Live Stock Branch and the Health of Animals Branch.

THE DUTY ON IMPORTED CATTLE

Following is a certified extract from the minutes of a meeting of the Treasury Board, held on the 20th May, 1920, approved by his Excellency the Governor General in Council, on the 26th May, 1920:

The Board recommend that the provisions of the Orders in Council of the 8th February, 1918, (P.C. 226), and the 30th January,

1919, (P.C. 1-233) providing for the remission and refund of duty on neat cattle imported into Canada, be further extended for a period of one year from the 7th February 1920.

(Sgd) RODOLPHE BOUDREAU,
Clerk of the Privy Council.

The Honourable
The Minister of Agriculture.

THE SEED BRANCH

SUBVENTIONS FOR SEED PRODUCTION COMPETITIONS

BY G. H. CLARK, B.S.A., SEED COMMISSIONER

THE subventions that any province may be entitled to receive on account of field crop competitions, combined seed crop and cleaned seed competitions, seed fairs and provincial seed exhibitions, are to be not more than two-thirds of the moneys awarded in prizes to competitors who are *bona fide* growers of exhibits as follows:

Field Crop Competitions.—The amount of the subventions must not exceed \$50 for each kind of crop. Subventions may be paid on account of competitions conducted with five kinds of crops under the auspices of any one agricultural society. The crops may include cereal grains, grass, clover, or other crops grown for seed. In the case of biennial crops, as

field root and garden vegetables, prizes may be awarded on the combined score of the rootlings and seed crop. There should be more than ten entries in each competition. Provincial Departments of Agriculture will be expected to file with the Seed Branch, Department of Agriculture, Ottawa, not later than March the first, following the field crop competition season, a statement showing the names and addresses of prize-winning competitors, the varieties and the origin of stock seed used by competitors in producing the prize-winning fields, and the quantities of seed produced therefrom and offered for sale.

Combined Seed Crop and Cleaned Seed Competitions.—The amount of the subventions must not exceed \$200 for each competition, and may be paid on account of any one kind of seed crop specified hereunder, to any one agricultural society. Agricultural societies that elect to conduct this class of competition will not be eligible to receive subvention moneys on account of field crop competitions conducted with the same crop during the same season.

The seed crop may be wheat, barley, oats, field peas, buckwheat, corn, beans, potatoes, clovers, and timothy. There must be at least 15 entries to a competition, and prizes should be based thirty-five per cent on the awards of the judges for the standing seed crop and sixty-five per cent on the awards of the judges for the cleaned seed, the latter to be judged either in the sack or bin on the premises of the competitor on or after December 15 following harvest and before March 1 the following year. If seed assembling, cleaning, grading, and storage facilities have been organized on a co-operative basis in a district where a combined seed crop and cleaned seed competition is being conducted, the judging of the cleaned seed may be done at the

warehouse of the co-operative association provided that the competitor is a member of the same.

The stock seed used by competitors in combined seed crop and cleaned seed competitions must be of approved origin, which may mean seed that is eligible for registration, or seed that is approved by a committee appointed by the provincial Minister of Agriculture, the District Officer of the Seed Branch to be recognized as an ex officio member of the committee.

The minimum quantities of cleaned seed that competitors must be prepared to submit to the judges on their premises in order to qualify for awards are as follows:—

Crop.	Bush.	Crop.	Bush.
Wheat.....	150	Corn.....	100
Barley.....	100	Field beans.....	25
Oats.....	200	Potatoes.....	150
Peas.....	100	Clover.....	15
Buckwheat.....	100	Timothy.....	15

In view of the important commercial seed supply that might be developed through this form of competition, the Seed Branch, Department of Agriculture, Ottawa, will use its organization in facilitating the marketing of the seed produced by competitors. This will involve official grading of the seed in accordance with existing commercial standards. Control samples on which certificates of grade are based will be drawn on the premises of each competitor by an authorized officer of the Seed Branch. This officer might well judge the seed in the second phase of the competition while attending to the other duty, and could return his awards to the provincial Department of Agriculture, where the final awards could be determined and the prize money issued.

Seed Fairs.—Seed fairs may be organized in conjunction with field crop competitions and prizes may be awarded on exhibits that represent a given bulk quantity of threshed and cleaned seed on the exhibitors' premises. Subventions must not exceed \$75.

Provincial Seed Exhibitions.—The amount of the subvention for each provincial seed exhibition must not exceed \$200 for each class of prizes awarded to *bona fide* growers on account of each of three classes, namely, (a) General class, (b) Exhibits from prize-winning or commendable fields of field crop competitions and combined seed crop and cleaned seed competitions, (c) Exhibits of selected seeds or plants that are recognized as eligible for registration.

If the available amount of \$200 is not used on account of class (c) exhibits the balance may be used on account of class (b) over and above the \$200, available to that class.

The total amount of the subventions that may be received by any

province will not exceed the sum of \$2,000, unless more than 1,000,000 acres of land are under cultivation in field crops within the province, in which case the subvention may be increased *pro rata* by \$2,000 for each additional million acres under cultivation in field crops as shown by the report of the Dominion Bureau of Statistics for the previous year, provided, however, that the total amount of the subventions to which any province is entitled on this account is not to exceed the sum of \$2,000 *pro rata* per 100,000 of total population, as shown by the latest available census returns.

Of the total amount of subvention money to which any province is entitled, at least 25 per cent must be used on account of the combined seed crop and cleaned seed competitions.

SENIOR SEED ANALYST APPOINTED

S. J. NEVILLE, B.S.A., Cottonwood, Saskatchewan, has been appointed Senior Seed Analyst and is working at present in the Ottawa Seed Laboratory. Mr. Neville graduated from the Ontario Agricultural College in 1910 as a Biology specialist, and spent the following two seasons as District Weed Inspector and Seed Analyst with the Saskatchewan Department

of Agriculture. He has also had experience at field inspection of seed crops for the Canadian Seed Growers' Associations. In 1916 Mr. Neville went overseas with the 203rd Winnipeg Battalion and served in 1917 with the 8th "Little Black Devils" in the Vimy-Lens area. The following year and a half was spent in correspondence course work with the Agricultural Department of the Khaki University.

The first farmer was the first man, and all historic nobility rests on possession and use of land—*Emerson in Society and Solitude.*

PART II

Provincial Government Departments

AGRICULTURAL CO-OPERATION

The articles appearing on the following pages have been prepared by responsible officers in several of the provinces. They present figures and arguments showing that agricultural co-operation is gaining impetus and is proving of practical value to producers and consumers alike. Through co-operative societies buying and selling of commodities is being accomplished with profit to the farmers, both educational and financial; also a number of important industries are being engaged in in certain localities. Among these the poultry and dairy industry take leading places. Among the more important branches of the co-operative organizations comes publicity. In several provinces the co-operative societies are issuing publications of their own.

NOVA SCOTIA

BY DR. M. CUMMING, SECRETARY FOR AGRICULTURE

AGRICULTURAL co-operation has made considerable progress in Nova Scotia in recent years. Farmers' co-operative companies are organized either under the "Farmers' Fruit, Produce, and Warehouse Association Act," Chapter 33, Acts of 1908, or the "Farmers' Co-operative Societies Act," Chapter 4 of 1914. The first mentioned Act contains provisions not only for the incorporation of local companies, but for the formation and operation of a central company to do business for all of the subsidiary companies. Substantial

progress continues to be made along these lines.

The Government of Nova Scotia confines its efforts, so far as co-operation is concerned, to providing the necessary legislation and to educational work. The actual working out of the policy is left entirely with the people themselves, except that, when requested, aid is given in the development of some special branches with which the people are not very familiar, such as the co-operative marketing of wool, lambs, and eggs.

QUEBEC

BY LUCIEN THERRIEN, B.S.A., LECTURER ON AGRICULTURAL CO-OPERATION

THE co-operative movement is growing steadily in our province. The majority of local co-operative associations are still found in the counties of Arthabaska, Bonaventure, Bagot, Champlain, Lotbinière, Nicolet, Shefford, and St. Hyacinthe; these associations both purchase and sell.

The following is a summary of 137 annual reports received up to date:—

Number of members.....	22,990
Subscribed capital.....	\$429,626 00
Paid-up capital.....	\$211,362 25
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Total receipts.....	10,432,585 82
Total expenses.....	10,279,094 02
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Surplus.....	\$153,491 80
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Assets.....	\$1,161,900 50
Liabilities.....	\$852,189 78
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Excess of assets.....	\$309,710 72

This large surplus is due to the fact that the figures given include all previous actual surpluses accumulated since the various co-operative associations were organized. For instance, the Central Farmers' Co-operative Association has a reserve fund of \$125,604.46, accumulated since it was organized in 1910. We might, with complete fairness, have increased the totals of assets and liabilities by adding to the balance sheet of almost all the co-operative associations the amount of subscribed capital, which is not given in the report.

The following is the turnover of three central co-operative associations, each of which serves the whole province:—

Quebec Federation of Agricultural Co-operative Associations.....	\$ 73,627 24
Comptoir Co-opératif de Montréal.....	420,106 29
Quebec Seed Producers Agricultural Co-operative Association.....	150,237 70

The first does only purchasing, the second purchases and sells and also distributes milk, the third sells seed grain of high quality.

The Federation has a magazine, *Le Co-operative Agricole*; le Comptoir has also an official publication, *Le Quebec Agricole*; both are bi-monthlies.

The Yamaska Valley Agricultural Co-operative Association sold last year \$208,977.09 worth of tobacco. This association has three hundred members; its subscribed capital amounts to \$42,600, and its paid-up capital to \$34,920. It made, last year, a net profit of \$20,048.32. The headquarters are at St Cesaire, Rouville County, where its warehouses are located.

The largest turnover of any local co-operative association was that of the Notre-Dame de Ham Co-operative Association, Wolfe county, with a paid-up capital of \$6,000, a subscribed capital of \$10,000. This

association has secured a credit of \$20,000 at the local branch of the Banque d'Hochelaga, Victoriaville. Its turnover last year was \$166,922.19 and its net profit \$3,605.14. This is a purchasing association.

AMENDMENTS TO THE LAW

Several amendments were made to the Co-operative Associations Act at the last session of the Legislature; under these amendments, shares subscribed from the 1st of March, 1920, shall be \$20, payable at the rate of \$5 per year, instead of \$10, payable in five yearly instalments.

No shareholder can subscribe for or hold more than \$1,000 of the capital stock of an association. The Association may settle the number and the amount of yearly instalments that must be paid for by any member subscribing for more than a share of \$20, provided that no yearly instalments are under \$5 per year.

No officer or employee of a co-operative association may vote by proxy for a member.

Any association neglecting or refusing to forward a report to the Minister of Agriculture after the 15th of February is liable to a penalty of five dollars per day for delay, and any director or manager of an association who, knowingly and deliberately, authorizes or tolerates such delay, incurs the same penalty.

CHEESEMAKERS' CO-OPERATIVE AGRICULTURAL ASSOCIATION

The character of the Quebec Cheesemakers' Agricultural Co-operative Association has been amended, and the powers of the Association have been made much more extensive than they were, as shown by the following:

1. The Association is authorized to take the name of "Quebec Farmers' Central Co-operative Association."

2. The Association may have an authorized capital of one million dollars, divided

in shares of ten dollars, payable at such time and in such a manner as may be prescribed by the directors, by regulations. At least twenty-five per cent of the amount of the shares subscribed must be paid within one month of the date of subscription.

3. No more than two thousand dollars may be subscribed by any one member, and the members must be farmers or members of agricultural associations.

4. The shares on which no payment has been made for the last three years may be confiscated after due notice by the Association. The Association has decided that no subscription of less than five shares of \$10, payable in two annual instalments of equal value, can be accepted; moreover, its new charter empowers the Association to confiscate any share of the new capital on which some payment has not been made within the prescribed delay, which may be reduced to thirty days.

5. The Association may purchase and sell, on commission or otherwise, import, export, manufacture agricultural products and by-products, manufacture agricultural implements and their parts, chemical fertilizers, do a retail and wholesale trade in these products.

6. Purchase any association or company having in whole or in part identical objects or powers. However, such power may only be exercised with the authorization of the Minister of Agriculture.

7. Establish a special fund, through the collection of a certain tax, to be set by the directors, on some agricultural products such as live stock, that are shipped to the Association, and indemnify the shippers by means of this special fund, for any deterioration or any total or partial loss sustained during transit or while these products or live stock are in the possession of the Association; the responsibility of the Association must not in any case be in excess of the amount of this special fund.

8. The borrowing limit is cancelled. Other co-operative associations are not allowed to borrow more than four times the amount of their subscribed stock, plus the reserve fund. This new privilege enjoyed by an Association will be the means of largely extending its export trade.

9. Two thirds of members present at a general meeting may authorize the directors to issue bonds, obligations, and other certificates.

10. At least ten per cent of the net profits made during the year shall be put in the reserve fund; the dividends paid the shareholders must not exceed ten per cent of the paid-up capital. If there is a surplus, the directors must put it in the reserve fund, which may not be distributed to the shareholders.

11. All the transactions of the Association are under the supervision of the Minister of Agriculture, who may ask for all the information that he deems necessary; the Minister may take part at meetings of directors, he shall have the privilege of appointing the auditor of the accounts of the Association and may require that the products be graded by graders appointed by him, if the interests of agriculture so require.

An exact copy of these amendments, of which the above is only a summary, may be secured by applying to the Publications Branch, Department of Agriculture, Quebec, Que.

The gratifying financial situation of the Cheesemakers' Association is clearly shown in the financial statement. The volume of the year's business amounted to a total turnover of \$8,293,466.37. The Association is in a good condition financially, the net profits shown in the statement being \$33,831.09 for the year 1919.

On the 31st of December, last there were in the Association 7,885 shareholders, private individuals or agricultural associations. The weekly paper of the association, *Le Bulletin des Agriculteurs*, is probably its most influential organ.

The number of regular subscribers to this paper is now over seventeen thousand; most are in Quebec and Northern Ontario.

To conclude, the co-operative movement is rapidly extending in our province. Progressive farmers realize that they have too long used for their purchases and sales middlemen that could more profitably be dispensed with. The idea of co-operation is taking shape in a practical and tangible manner, not only among associations organized under the Agricultural Co-operative Associations Act but also among our farmers' clubs, numbering over 850, among our patrons' associations, butter and cheesemakers' associations, breeders' syndicates and other organizations that have not, as yet, any civil standing.

ONTARIO

BY F. C. HART, B.S.A., CO-OPERATION AND MARKETS BRANCH

IN the field of agricultural co-operation in the province of Ontario, the greatest advance during the year has been made in connection with the shipping of live stock. Five years ago there were practically no live stock shipping clubs. At the present time between three and four hundred separate organizations (including farmers' clubs) ship co-operatively. A little over a year ago the United Farmers' Co-operative Company, Ltd., purchased a seat on the Live Stock Exchange at Toronto, and this fact proved a great impetus to club shipping. The first year's business of the company amounted to some ten million dollars, the company receiving about 30 per cent of the total shipments through the yards. Some of the local organizations, however, sell part of their shipments direct to the abattoirs on the f.o.b. basis. It has been found impossible to determine the amount of such co-operative shipments. There are a few single organizations which conduct a business, including shipments both through the yards and to the abattoirs, approaching one million dollars. Present indications point to the possibility, within the next few years, of the larger proportion of the live stock of Ontario being shipped from the producer co-operatively.

The second important development in the province is that in connection with egg marketing. The year previous to this there were about fifty active egg circles in the province marketing eggs and poultry, to the value of about \$120,000. The number of circles has increased until at the present time, there are some sixty circles in operation, and farmers' clubs as well as egg circles are now taking up this important work. The most noticeable development is in the grouping of circles in various

districts for the purpose of establishing candling and grading stations, and already some three districts are so organized, each consisting of a dozen or more local circles.

In the past co-operative egg marketing has developed more largely in Eastern Ontario than in Western Ontario; at the present time, however, the western end of the province is beginning to take an interest and substantial organizations are already in existence. In one county alone, arrangements are being discussed to ship circle eggs in car-load lots. The United Farmers' Co-operative Company has recently opened a department for eggs and poultry, and this fact will doubtless have the same effect as that in connection with live stock shipping.

A development in connection with co-operative marketing is the movement started during the year to combine under one central company the manufacturing and marketing of the cheese from local cheese factories. Eastern Ontario has been canvassed. The company has been but recently incorporated and is not yet in operation. If the plans of the incorporators are carried out it will effect a radical change in the marketing of Ontario cheese.

The larger proportion of the Ontario apple crop comes from the orchards of general farmers, the orchard being maintained as a sideline. With the scarcity of help prevailing in the province these sidelines have been the first to suffer neglect, and on this account many of the small apple growers' co-operative associations outside of the regular apple districts have not been very active. In the apple districts and in the other fruit districts, however, orchards have been reasonably well cared for and the old established associations are showing progress. Some of these fruit growers'

associations have added to their business other lines of trade, such as the buying of farm supplies, feeds, etc.

The co-operative marketing of wool was continued last year through the Ontario Sheep Breeders' Association as previously. The Canadian Co-operative Wool Growers, Limited, marketed a total of about 4,000,000 pounds, and of this amount Ontario supplied 775,000 pounds. It is estimated that the total production of Ontario is about 2,500,000 pounds annually. Thus, 31 per cent of Ontario's wool was marketed co-operatively last year.

A large proportion of the co-operative work of the province is carried on through unincorporated local farmers' clubs, of which there are some twelve or thirteen hundred in the province. The great majority of these are affiliated with the United Farmers' Co-operative Company, Ltd., which acts as a wholesale house for these clubs. The amount of business transacted by some of the clubs is remarkable. There are, of course, a number of clubs which do only part of their trading through the central company; the wholesale business, however, as reported in the annual statement of the central company, amounted to \$8,500,000. This will no doubt show a substantial increase in the next statement, since the company has established a number of branch stores at various points throughout the province, and is continuing to establish separate departments of the business at the head office. The departments now organized by the company include: Commission, Co-operative Trading, Live Stock, Egg and Poultry, and Creamery.

With the increase of business and the subsequent larger financial transactions an increasing number of clubs have become incorporated under the co-operative section of the Ontario Companies Act. During the year there have been eighty incorporations,

either as share or non-share co-operative companies. Where the club has reached the stage when it feels that incorporation will be beneficial, usually its business is on a more or less substantial basis and gives promise of being permanently successful. One such organization, for instance, handling live stock, feeds, grains, and other commodities and buying supplies, is doing a business which averages about \$1,000 a day.

There are other organizations in the province that do not actually carry on business, but whose work is one phase of co-operative endeavour. Such organizations are: Milk Producers' Associations, Grape Growers' Association, Sugar Beet Growers' Association, Tobacco Growers' Association, and associations of like nature which endeavour to study market conditions and advise their members as to prices. In some cases the association confers directly with the trade as to the prices to be paid the growers. Recent developments would indicate that out of these organizations may grow commercial co-operative companies of producers controlling the output of the members.

A great deal of preliminary work has been done by the Department during the year in connection with the production of pure seed, more particularly of potato seed in Northern Ontario. This work is leading to the organization of commercial seed centres, a few such centres having already been formed.

The trend of agricultural co-operation in the province during the last year or so is more in the direction of co-operative marketing than previously. Farmers' clubs are usually formed with the idea of combining the purchasing of supplies for its members, and this line of business is usually the first attempted by the clubs. The amount of co-operative marketing business done during the last year has, however, exceeded the supply business in the province, and

justifies our opinion as to the relative importance to the farmer of the co-operative marketing of his products and the buying of his supplies.

The above remarks make note of some of the outstanding features relating to agricultural co-operation during the year. That the co-operative idea is permeating Ontario agriculture is evidenced by the numerous instances of local co-operative endeavour which a few years ago would be considered as

outstanding. The older associations have enlarged their operations, and the newer associations are entering on their work on a more sound and substantial business basis. The smaller associations are uniting their efforts through the larger organizations, so that an increasing number of the functions of middlemen are being taken over by the co-operatives. The outlook for sane and substantial progress in the province is indeed bright.

ALBERTA

J. MCCAIG, EDITOR OF PUBLICATIONS

ORGANIZATION in agriculture for co-operative activities is not a branch of administration in the Department of Agriculture. The principle of co-operation is put into expression by the various branches of administration in cases where co-operation will apply or give good results in either production or marketing, and there are a good many of such cases. There are also various kinds of co-operative associations of voluntary origin among farmers. The forming of such associations is done under the authorization and encouragement of The Co-operative Associations Act.

One of the important branches of co-operative work is that of butter production, authorized and regulated by the Dairymen's Act and directed by the provincial Dairy Commissioner. There are fifty-three co-operative creameries and thirteen private creameries receiving cream according to grade and selling butter on the grades of the Dairy Commissioner and, if desired, by the Dairy Commissioner's office. Over ten million pounds of creamery butter have been produced by the creameries this year. The type of co-operative work done under the Dairy Branch and the efficiency of the service have had several important effects: the raising of the standard of Alberta

creamery butter to a point not surpassed in the Dominion; the establishing of grades and standards in both local and outside markets from Vancouver to Montreal in Canada, from Seattle to New York in the United States, and in Belgium and Liverpool across the Atlantic; the raising of the price for surplus of top grades; the giving of steadiness in returns to producers throughout the year, and causing steady expansion of the industry.

The Department of Agriculture also conducts a poultry and egg marketing service. Poultry products, more especially eggs, are received, partly paid for, graded and sold from central grading and warehousing centres at Calgary and Edmonton. Shipments are received either from individuals or associations, but it is an important part of the work of the branch to organize and have shipments made by co-operative groups.

District agents of the Department are making progress in organizing potato growers' associations, for the purpose of reducing the number of varieties, increasing the quantity, improving the quality, and consolidating the selling of the product. The same officials are promoting poultry, calf, and pig clubs among boys and girls.

The women's institute is an important co-operative institution established under the Institutes Branch of the Department of Agriculture. Both country, town, and city women are included in the membership. They carry on a steady campaign by lecture and demonstration work in cooking, canning, nursing, sewing, the nourishment and care of children, relief work, girls' clubs, and social activities.

Alberta has an act called the Alberta Co-operative Credit Act, which provides for associations of farmers to furnish and guarantee loans to members. The Treasury Department shares equally with the associations in guaranteeing the loans. Money is secured from the banks in the ordinary way, loans run for a year, and the use of money pertains to any kind of legitimate farm expenditure relating to equipment, stock, surface improvement, cultivation, wages and expenses. There are eight of these societies in operation and others forming.

The Live Stock Encouragement Act provides for loans to co-operative groups of farmers to the number of five and over. The loans run for five years with interest at six per cent payable each year. The Government guarantees repayment. The Live Stock Commissioner administers the Act. He inspects and approves or rejects the purchases,

controls the sale of stock and enforces branding through his inspectors. A million and a half dollars has been loaned so far under the Act. The number of associations is six hundred and eighty-one.

Among the organizations of voluntary origin the largest is that of the United Farmers. Locals buy and sell co-operatively. In some cases live-stock shipping associations are formed separately. The United Elevator Company is another large concern that deals in live stock as well as grain and likewise carries on a large distribution business to farmers as well. The United Farm Women are doing an important work relating to the business of house-keeping, and expanding into social improvement through schools, hospitals, nurses' patriotic and benevolent work.

Co-operative business is developing through the improvement of selling services among breeders of pure-bred stock. This finds expression in congress sales apart from those carried on by breed associations and exhibition associations. At several points in Southern Alberta hay growers' associations have been formed.

Ninety per cent of the wool of the province is sold through the Canadian Co-operative Wool Growers' Association. The wool is assembled and graded by co-operative local associations of members who unite for this purpose.

Over 7,700 boys and girls were engaged last season in producing food and clothing in agricultural and home economics clubs conducted by the Ohio State University and the United States Department of Agriculture, and 3,200 youngsters produced products valued at \$164,000. The net profit of their effort was \$115,000. Besides the money earned the boys and girls developed initiative, spirit of fair play and business sense. Nearly 400 boys and girls won trips to Farmers' Week at the Ohio State University.—*Ohio Farmer*.

DAY-OLD CHICKS

The policy of the federal and provincial Departments of Agriculture with respect to the day-old chick business was discussed in *THE AGRICULTURAL GAZETTE* for May, 1918. Since that time changes have been introduced and new methods adopted. The articles appearing on the following pages have been gotten together to show what progress has been made in the provinces. In Part I of this issue is an article explaining the policy of the Experimental Farms System. A number of provinces have not contributed articles as they have made no attempt as yet to hatch or secure day-old chicks for persons wishing to secure them.

NOVA SCOTIA

BY J. P. LANDRY, MANAGER AND LECTURER, POULTRY DEPARTMENT

THERE has been an increased demand for day-old chicks from persons interested in poultry in the province of Nova Scotia. In arranging to comply with their wishes for day-old chicks the poultry department at the Truro Agricultural College made arrangements with a hatchery operated by the Pittsfield Farm Company of Holliston, Mass., to take the orders which we collected.

By the 15th of May about seven thousand chicks were arranged for in Nova Scotia and some were shipped to New Brunswick and Prince Edward Island. The undertaking was objected to by some persons owing to the unfavourable rate of exchange, but the proprietor of the hatchery entered into an agreement by which the existing rate of exchange would be equally divided between this department and the United States hatchery.

The chicks were shipped direct from the hatchery to the individuals ordering them. Express charges were

added to the cost, but there was no duty on these importations. It was possible to select from among five breeds, the prices being thirty-two cents each for all but White Leghorns, which were quoted at thirty-one cents. The firm guaranteed the safe arrival of the chicks and agreed to replace those dead on arrival or refund the money.

The chicks were from specially selected stock inspected by the United States inspector for poultry diseases and pronounced free of all diseases. The size of each order was limited to not less than twenty-five chicks and special arrangements were required for all orders over two hundred.

Our first experience with this work has been very satisfactory, and we have been able to interest many people in poultry production who would not otherwise pay much attention to production if they depended upon their own efforts in hatching young chicks.

NEW BRUNSWICK

BY A. C. MCCULLOCH, B.S.A., POULTRY SUPERINTENDENT, DEPARTMENT OF AGRICULTURE

THE Department of Agriculture has taken no steps to prepare for an active business in day-old chicks, except to install and operate a few incubators of small size. These are operated in the office and serve to supply any small orders which are received.

The incubators are run quite as much for the sake of handling an irregular supply of eggs received from our boys' and girls' poultry club members at this office, where these are sorted, repacked and sent out for hatching purposes. At times there is a greater receipt of eggs than is

required for the orders booked for shipment and the incubators merely take care of this overflow.

A series of Mammoth incubators might well be run either at one central station in the province or at several central points to accommodate the respective sections. This plan would be a great convenience and of assistance to boys' and girls' poultry club members as well as to the general poultry-raising public.

The day-old chicks are shipped by express. Unfortunately express companies do not understand very well the proper handling of this commodity. Results have been much more satisfactory during the present season than last year.

Owing to our climatic conditions artificial incubation is necessary for an extensive poultry business and there is unquestionably a growing demand for day-old chicks.

QUEBEC

BY BROTHER LIGUORI, LECTURER IN POULTRY AT THE OKA AGRICULTURAL INSTITUTE

THE Department of Agriculture of Quebec has this year made a promising beginning in a co-operative plan of distributing day-old chicks to farmers. The work was instituted and is carried on by a local association known as the County of Hull Poultry Association. The Department of Agriculture, at the request of this association, has furnished two incubators, each with a capacity of 2,500 eggs. The society has a number of smaller machines, which bring the egg-hatching capacity up to 6,000 at a time. The society has obtained from the principal poultry yards throughout Ontario and Quebec 15,000 eggs. While early hatches are reported to have run as low as fifty per cent, much better results have been obtained later in the season. Incubation on this plan worked out at a cost of a little under two cents an egg, but it is expected that this will be improved upon as a result of this year's experience. The Department at Quebec also provided a technical adviser.

they reach "range" age, when they are returned to the member, who is charged only the exact cost of incubation and feed. Between March 21st and June 1st the society raised 2,200 chicks at a total cost of \$150. The result of this season's work is so satisfactory to the Department at Quebec that it is planning to extend the system to other parts of the province. For this purpose the province would be divided into several districts with a hatching station in each.

The services of the instructor of the Hull society, who, as already stated, is provided by the provincial Department, are entirely at the disposal of the members. Besides directing the work of the station he gives a lecture and demonstration every Monday evening all through the year on the week's work. The lectures are given at the hatchery. He also visits the homes of the members to advise and help them in correcting their errors in breeding, feeding, and housing.

METHOD OF OPERATION

According to the plans of the society any member may place any number of eggs he wishes in the incubators, or, should these be working at capacity, in the smaller machines. The chicks, after hatching, are removed to the brooders, where they are kept and fed until

HOPES AND PROSPECTS

By a system of careful breeding and trap-nesting the society hopes to quickly raise the standard of the poultry raised in the county and even beyond. It is the expectation of the society's officers that next year there will be 1,200 pullets under trap-nest with the object of securing their

record of production. Only those birds of that quality to a standard of 150 eggs or better will be mated for breeding in 1922, that is to say, in that year only the eggs of proved high producing hens will be hatched co-operatively for distribution.

Next season it is planned to extend the activities of the society amongst the school boys. This work has already begun, free courses of instruction being given at the hatchery to sons of farmers, or other young men who care to avail themselves of them.

The society has a plan whereby new members are given a setting of eggs of standard quality. These settings are provided by the members who during the second, third, and fourth years contribute one setting each. The new member is at liberty to hatch these eggs privately, or he may take advantage of the association's co-operative brooding plan.

TESTS AND PLANS

The Quebec Poultry Division has been testing several plans more or less congenial. For instance work of the kind, with slight variances in each case have been conducted in Quebec City itself with an incubator capacity of 10,000 eggs at a time; at St-François-du-Lac near Abenaki Springs, Yamaska county, capacity 8,000 eggs;

at Princeville, Arthabaska county, 6,000 eggs; at St-Hyacinthe, 2,500 eggs, and at Montmagny, incubators have been filled up thrice yearly.

The Division is about to conclude that the Hull County system is the best, provided the right man can be found to operate it; and that means a man having technical competency, special aptitudes and much devotedness as to "missionary" work; such as has been the case in Hull county with the President of the Quebec Provincial Poultry Association, Dr. S. Lafortune.

THE ONLY TROUBLE

The main difficulty—one might say the only serious difficulty—in carrying on such work is the securing of the proper eggs, *i.e.*, eggs strongly fertilized, properly cared for, and properly kept, and their transportation and manipulation until they reach the incubator room. This means the local instructor has to keep busy all the year round, every month, and mostly every day, in order to prepare and secure in each farm the desired supply of proper eggs. In other words, the difficulty is not to get the amount of eggs—any amount can be secured—but the difficulty is to obtain the proper, strongly fertilized eggs of a good breed and strain.

MANITOBA

BY GEO. BATHO, EDITOR OF AGRICULTURAL PUBLICATIONS

MANITOBA, during the last few years, has bought a large number of day-old chicks. The demand has been considerably more than the local supply, with the result that thousands were shipped in from the south. The Manitoba Agricultural College has distributed a few thousands annually for the last few years, charging the regular market price for them. A few small commercial hatcheries have

been established, but they are run entirely by private enterprise.

We feel that the day-old chick business is a commercial one, and have no doubt that within a few years enough commercial hatcheries will be established to supply the local demand. We are encouraging such commercial hatcheries, but do not think it necessary to enter a field that can be better looked after by private individuals.

SUMMER SCHOOLS FOR TEACHERS

Several of the provinces of Canada have for some years been offering summer courses for teachers conducting agricultural classes in their schools, both rural and urban. These courses usually last from one month to six weeks during the summer vacation, and they are well attended by teachers wishing to improve their academic standing and prepare themselves for more remunerative work in their schools. There are very few changes in the programmes for the present year, although some new features have been added. The report for Ontario appeared in the May issue of THE AGRICULTURAL GAZETTE and following are articles from four of the other provinces.

NOVA SCOTIA

L. A. DEWOLFE, M.S.C., DIRECTOR, ELEMENTARY AGRICULTURAL INSTRUCTION

THE Summer Session of the Rural Science Training School will be held in Truro, July 7th to August 5th, 1920. This promises to be by far the best session in our history. All our regular Science and Nature Study courses are offered. In addition we have added attractive lecture courses on popular and educational topics; have included household economy; and shall conduct a variety of entertainments, plays, and sports. We hope to overlook nothing that the modern, progressive teacher will need in her school or her community work.

RURAL SCIENCE DIPLOMA COURSES

The following classes are now offered at the Rural Science School for teachers seeking a Rural Science Diploma and for those who desire to improve their knowledge in Natural Science: (1) Nature Study, (2) Botany, (3) Biology, (4) Chemistry, (5) Physics, (6) Geology and Mineralogy, (7) Plant diseases, (8) Entomology, (9) Horticulture, (10) Agriculture, (11) Bird Study, (12) Weather work, (13) Wood work, (14) Brush and Cardboard work, (15) Bacteriology.

GAMES AND CONTESTS

The early evening hours and spare hours will be devoted to games and contests. Both outdoor and indoor games suitable for schools will be taught. There will also be periods for story telling. Folk dancing and

musical games will be an important feature of this part of the programme. Community singing also will receive attention.

Those dramatically inclined will have an opportunity to assist in various plays and entertainments.

Simple pageantry as it can be applied to the rural school and community will be dealt with in a practical way. During the summer a parade will be staged featuring the various branches of rural science activity.

EXTENSION

Under this heading will come suggestions on the use of special days in school such as Arbor Day, School Improvement Day, Good Roads Day, Bird Day, Weed Day. We shall have practical demonstrations in the working up of campaigns by means of posters and advertising (purely in the school). An important innovation will be the bringing in of business and professional men to give short talks. For instance a banker will tell us things about his business that everyone should know. A stockbroker will give us hints on the arithmetic and business of brokerage. A manufacturer and a dry goods merchant will help us with the commercial geography of their business.

LECTURE COURSE

In addition to the short talks by business men (see "Extension") we shall offer a few lectures on practical

psychology, corrective punishment, care of the feeble-minded, child welfare and allied subjects. Persons of note who should be visiting in or passing through Truro will be asked to address the Summer School on some live topic. We shall have one or two important lectures on "The Old Home Summer, 1924."

HOME ECONOMICS

Home Economics will include talks and demonstrations on Home Nursing, the district nurse, symptoms of common diseases and First Aid. Simple cookery and the school lunch will receive generous attention. So will sewing for rural schools. Every student must do practical work in canning.

READING COURSE

A helpful part of our course will be talks on library books, after which

the student will be asked to read certain portions. In this connection we shall devote special attention to books assigned to be read between terms by candidates for a Rural Science diploma. Selection of books for the school library will be an important item.

A PHYSICAL TRAINING COURSE

Leading to the Teachers' Grade B. Physical Training certificate, an instructor will be provided by the Dominion Department of Militia and Defence. Attendance in this class, however, will not qualify students for any aid from the Rural Science funds. It has been intimated from Ottawa that no bonus will be paid those taking the course. The providing of an instructor is all that can be done. The physical training course is of four weeks' duration, synchronizing with the Rural Science course.

NEW BRUNSWICK

BY A. C. GORHAM, M.SC., DIRECTOR OF ELEMENTARY AGRICULTURAL EDUCATION

THE Rural Science School for Teachers is being held again this year at Sussex, July 14th to Aug. 11th. A syllabus of the courses is given in the May issue of the Rural Education Monthly.

No text books are required. All courses are made as practical as possible and are designed to give information that will assist the teachers in carrying out the teaching of Nature Study and Elementary Agriculture as prescribed by the Board of Education in this province. Nature Study and Elementary Agriculture is obligatory in all our schools in grades up to and including Grade VIII of graded schools, and in all grades including Grade V, of ungraded. Many teachers are not sufficiently conversant with subjects included in the Nature Study and Agriculture course to teach it. This summer school affords

an opportunity for teachers to familiarize themselves with this work. Better informed teachers is the biggest factor in the plan for the improvement of nature courses and for the placing on a permanent basis every phase of the work.

Besides the courses in Nature Study, Farm Physics, and Gardening we expect to put on a new course in place of the Chemistry course. It is to be a combination of Cereal Husbandry and Plant Physiology. It is hoped that this will be a more practical course and at the same time the study of Agricultural Chemistry will not be forgotten, as Plant Physiology is based on the sciences of Chemistry and Physics.

Financial assistance is given to those who attend the Rural Science school. School gardens are maintained only by teachers who have

taken special instruction in gardening and agriculture at the summer school for teachers. For those who successfully complete one year at the Rural Science school, put in and maintain a garden at their school, the Government offers a special grant of thirty dollars. To those taking the two summer courses, a grant of fifty dollars will be paid. Besides this a bonus of 20 dollars is granted to all teachers who have taken either a one year or a two year course, and have taught Nature Study and Agriculture with School Gardening the year subsequent to their attendance at the Summer School.

TEACHERS' CAMP

This year for the first time a Teachers' Camp has been organized for the purpose of affording recreation and reducing the cost of living. Permission has been granted by the military authorities to use the camp grounds, one of the bungalows and a certain number of bell tents. These will be fitted with cots, three to each tent. Every tent is set on a wooden floor. The camp is but five minutes walk from the Agricultural Building.

The free life of the open fields and wood land appeals to every lover of nature. The facilities for studying the forest trees, ornamental trees and shrubs, and life in the pools and running streams, are but a few moments removed from the site of the camp. The fresh air, the sunshine and a chance to relax should be greatly appreciated by every teacher who has been confined to the school room for so many months.

CAMPING OPTIONAL

Living in camp is optional, and students must state clearly when

making application whether they wish to live in camp, or desire us to send list of boarding places to them. Boarding places are taxed to their utmost. Only a few houses will be able to provide rooms and board. Rates are much higher than in former years.

Students should avail themselves of the opportunity of living together in camp, not only because it will be more economical, but because of the social life it affords.

There will be no room rent; only the cost of food and cooking. Expenses will be divided according to the number actually in camp. Each student or member of the camp will have to provide his own blankets and pillow.

The management of the camp will be left largely in the hands of the students. Committees will be formed to see that certain necessary activities of the camp are carried into effect. There will be few rules, but these must be strictly observed. A chaperon will be chosen.

The dining room will be established in one of the bungalows, near which all the tents will be set up. The camp will be supplied with water and electricity from the town system.

Many games will be indulged in, as base ball, tennis, volley ball, and others.

The river, which is one of the sources of the Kennebecasis, affords excellent facilities for bathing. Instruction in swimming, etc., will be given on request.

With these new features and the rearrangement of courses we expect a larger number of students than usual.

ONTARIO

SUMMER SCHOOL FOR RURAL LEADERSHIP

FOR the past five years there gathered at the Ontario Agricultural College, Guelph, classes numbering anywhere from fifty to one hundred and fifty persons interested in the educational, social, religious, recreational, and other problems of rural communities. These students interested in rural problems have been mainly clergymen and women's institute officers. They attend the classes during the two weeks of the school, gathering new ideas through the exchange of opinions and from the lectures given by special speakers and the officers of the college. These new ideas they employ in their home communities, where young and old alike benefit by the spirit and enthusiasm of their leaders.

This year the summer school for rural leadership at Guelph opens on Monday, July 26th, and closes Friday, August 6th. President J. B. Reynolds of the college is to be the principal speaker, and he will give a course of ten lectures on rural

problems. Other subjects to be discussed include consolidation of rural schools, the churches' programme of boys' work and community recreation, county Y.M.C.A. work, mental hygiene and other subjects having a bearing on the betterment of community life. The work of the Ontario departments of agriculture and education will be dealt with some time during the course by the Honourable Manning Doherty and the Honourable R. H. Grant, while the aims and objects of the U.F.O. will be discussed by Mr. J. J. Morrison, secretary of the farmers' organization.

Besides the special subjects taken by the rural ministers and other officials attending the course, these students are able to attend a number of the classes in agricultural science, along with the school teachers attending the school for teachers. This gives the rural leaders an opportunity of obtaining information on their own special subjects, and also of gathering ideas on the scientific principles underlying the practice of agriculture.

SASKATCHEWAN

BY G. H. LING, DIRECTOR OF SUMMER SCHOOLS

THE University of Saskatchewan, in co-operation with the Saskatchewan Department of Education, are holding their summer session from July 5 to August 13 this year. Among the new features of this year's session, there is the work of Dr. H. T. J. Coleman, Dean of the Faculty of Education of Queen's University, Kingston, Ontario. He is presenting work both to teachers and to the university students in the degree courses. Dean Coleman will give one class in education primarily for undergraduates

and one primarily for teachers. Another new feature of this summer's course is the work in physical education by Miss Jessie Bancroft, of New York, author of "Posture of School Children." She is giving special lectures in posture and its relation to health. The work in physical education and in music is being amplified.

The general plan of our work is to offer certain subjects in rotation, so that a student coming repeatedly to the summer session can get a considerable variety of subjects. It is

believed that the summer session is making a special appeal to teachers and others from the East, who are employed regularly in the winter, but who instead of returning to the

East for their vacations wish to spend them in the West in work that is agreeable and useful, and under conditions that are pleasant.

ALBERTA

BY G. FRED. McNALLY, SUPERVISOR OF SCHOOLS

THE Alberta Summer School enters upon its eighth session this month. The advance enrolment is very heavy and the indications are that the attendance for the current year will be well above five hundred. The session of the school will be held at the University of Alberta, the University generously placing its entire plant at the disposal of the Department of Education for the Summer School.

Established courses in Elementary and High School Science, Household Economics, Art and Manual Arts, will be continued. These in the past have proved very popular and give promise of being well attended again this year. Particular stress is being placed this year on three phases of work, viz., public school music, especially chorus singing; physical and

health education, and education for citizenship. Under the regulations of the Department of Education in Alberta, teachers are made responsible for the supervision of the play grounds during all play periods. To make this supervision more valuable, the teachers are given two sessions of organized play at the Summer School. Other courses in hygiene and health, and free standing and apparatus work will be offered.

The courses for special qualification for primary teachers, for teachers of non-English schools, and for British and American teachers, will be continued. A course in educational measurement will be offered for the first time this year. Demonstrations of the use of group intelligence testing will be given as well as practice in the use of some of the standard tests and scales.

BRITISH COLUMBIA

BY J. W. GIBSON, M.A., DIRECTOR OF ELEMENTARY AGRICULTURAL EDUCATION

THE courses offered at the Summer school now being held at Victoria, B.C., include preliminary and advanced work in rural science, manual training, art, household economics, and vocal music, in addition to first year courses in primary grade work and physical training and health education.

The courses in Rural Science emphasize those subjects most needed by teachers of the grades in Nature Study and School Gardening, such as the study of wild plants, insects, and birds, but also include subjects of a

more distinctly agricultural nature, such as soils, field crops, and farm animals. In manual training, courses have been arranged for rural teachers as well as for city teachers who aim at becoming specialists. Similarly in home economics courses have been arranged to meet the needs of rural teachers as well as grade teachers in city schools, and also specialists. The course for primary grade teachers combines lectures on methods underlying primary education together with practice in manual work, story telling, dramatization, and singing.

The only new course to be added is the one dealing with physical training, hygiene, and public health. In this course emphasis is placed on training in school games and calisthenics on the one hand, and on the teaching of personal and general hygiene on the other. First aid and home nursing will be included, together with such topics as children's diet, health records, the public health nurse and her relations to the school.

Special classes in writing and penmanship will be held for teachers taking other courses and also two short courses dealing with modern educational problems with special reference to the rural school. One of the latter is to be given by Arthur Anstey, B.A., Inspector of Schools, and the other by Professor O. J. Kern of the University of California.

QUEBEC

VETERINARY SCIENCE WORK AT MACDONALD COLLEGE

VETERINARY work at Macdonald College, under *The Agricultural Instruction Act*, consisted, in 1919, of several phases which may be summarized as follows:—

INSTRUCTION

Four different and graduated courses in veterinary science have been provided for students in the School of Agriculture: (1) An elementary lecture course for first year students. This included gross anatomy and elementary physiology of domestic animals, and related particularly to the digestive system. The principles of hygiene and nursing, the administration of simple medicines, care of the feet, teeth, and first aid treatment of common injuries were dealt with. (2) Practical veterinary studies for second year students, including the causes, symptoms, treatment and prevention of certain of the diseases of farm animals. (3) Animal physiology. A fairly comprehensive course for animal husbandry specialists designed to correlate their knowledge of the chemistry of feeds with practical live-stock management; including a study of the normal reproductive functions and

of locomotion. (4) Advanced veterinary studies. A course designed to give live-stock specialists a broader understanding of veterinary topics than the above, but not to make them unqualified practitioners of veterinary medicine. Parasites, obstetrics, and the critical examination of horses for soundness were emphasized.

EXTENSION

(a) A limited number of farmers' clubs have been addressed on veterinary topics of practical concern—tuberculosis, abortion, etc. (b) Correspondents seeking information on veterinary matters have been given advice. (c) In the vicinity of Ste. Anne a number of professional calls have been made free from charge, particularly in connection with the diseases of breeding animals.

RESEARCH

(a) Data on a number of topics related to veterinary gynaecology is in the process of collection. (b) Two technical papers have been published by the College veterinarian in *The Veterinary Journal*, London.

MACDONALD COLLEGE GRADUATES

FIFTEEN graduates received the degree of Bachelor of Science in Agriculture at a special convocation of McGill University held at Macdonald College last month.

This is the tenth group of students who have completed this course, which requires four academic years in the faculty of agriculture for completion, the instruction being given at Macdonald College.

This year's class is rather smaller than those of former years and is largely made up of men whose course was interrupted by overseas service.

So far few of the agricultural graduates have gone into actual work on the land on receiving their degree, but have been absorbed by governmental work. The federal and provincial departments of agriculture have secured their services for use in teaching capacities and in other technical work carried on in connection with the agricultural departments.

Of this year's class eleven are from the province of Quebec, three from the Maritime provinces, one from the Dominion of Newfoundland, and one from the United States.

ONTARIO

CHANGE OF COURSES AT THE AGRICULTURAL COLLEGE

ANY candidate for admission to the Ontario Agricultural College may enter the two-year course in agriculture who is at least 18 years of age and who has had one year of farm experience. Candidates for the degree course must be 18 years of age; must have had one year of farm experience; and must have passed the examination for Junior University Matriculation; or experienced farmers who are twenty years of age or over, and who lack not more than one year's study of matriculation standing, may commence the four-year course on the condition that they complete their matriculation before entering the third year.

An agricultural college is expected to satisfy two distinct demands:—

1. To train and educate men who intend to make farming their occupation.

2. To train and educate men who will become professional agriculturists, that is, teachers, investigators, agricultural representatives, journalists, administrators in agricultural departments.

Up to the present the Ontario Agricultural College, as well as some other agricultural colleges in Canada, has tried to combine these two aims. The course for those intending to farm has covered two years. To the end of this two years' course, the course for technical or professional agriculturists has been the same as for those intending to farm. For professional agriculturists, two years are added, making a four-year course leading to the degree of B.S.A. It is felt that these two aims are so different that the attempt to combine them in the same course has lessened the value of the course for either purpose. It is now proposed to recognize this difference of aim, and to establish two entirely distinct courses in agriculture.

THOSE INTENDING TO FARM

About twenty-five per cent of those who enter the Ontario Agricultural College continue for the four-year course. A small proportion of this

twenty-five per cent become farmers, but the most of them become technical or professional agriculturists. It is quite apparent that the course intended for farmers should not be weakened by attempting to combine it with another course that has a very different purpose. The separation of the courses would have been made long ago but for this reason. It was claimed, with considerable truth, that most students when entering the College for the first time could not decide whether they would spend one year, two years, or four years. It was, therefore, necessary, if they were to be given time to make a choice, that the course for farmers and the course leading to the degree should be identical for the first two years. By the end of that time they had made the choice, or the matter had been decided for them by their class standing. The teaching staff of the College has now concluded that, everything considered, it is best that the choice be made before the students embark upon the courses.

DEGREE WORK

There is another factor which will enable the choice to be made upon entering. Many boys come to the College from farms without much, if any, high school or collegiate institute education. An advanced education in Mathematics, English and Natural Science, while desirable for a farmer, is not absolutely necessary. A farmer can understand and apply the results of natural science to the work of production without an extended course in the methods whereby those results have been attained. He can keep the necessary farm accounts and transact the business of the farm without mathematics beyond a good elementary public school course. A command of good pure English is highly desirable for any Canadian citizen, but it is not necessary to take an extended course in English grammar and literature in

order to be a good farmer. But advanced work in these subjects, that is, advanced beyond the public school grades, is necessary for those who intend to proceed to a degree in agriculture. Accordingly, for the degree work it has been decided that high school matriculation shall be required, whereas for the two-year course no educational standard will be exacted. Some practical acquaintance with farming, and a desire to profit by the best practical teaching which the College can give, are the only conditions of admission required for the two-year course.

FARM PRACTICE

It is important at this juncture to insist that the amount of practical training, that is, actual work in handling horses and implements, handling, and feeding live stock, and many other farm operations that can be given at an agricultural college, is strictly limited. The amount of actual work called farming that can be required of any one student among seven hundred students is very small. When a young man without farming experience applies at the Agricultural College to be taught "farming," which for him certainly means to learn to do the work of the farm, he is generally advised to work on some good farm. If, in addition, he can afford the time to go to the College to learn what the College has to teach him after he has gained the actual farm experience, so much the better.

THE TWO-YEAR COURSE

Any practical work that can be given to a large number at once is of course given, for example, judging live stock, poultry, and grain; identifying weeds and weed seeds; testing milk, making and judging butter and cheese; simple carpentry and blacksmithing, and operating tractors. The

principles of pruning trees and grafting fruit buds can be taught, and possibly some practice given, if the season of the year permits. A class of students can be taught the composition of animal foods and of fertilizers. They can learn in class what kinds of feed are best to produce growth, or meat, or milk; what kinds of fertilizers are best for potatoes or corn; what methods of cultivation are recommended for these crops, and what best for controlling wild oats or sow thistles. This kind of knowledge is invaluable to the farmer and this knowledge the College can give. But to impart the experience and practical skill necessary to carry out the directions given is beyond the limits of the College equipment. A farm is the place for such training. Further, the two-year course is based on the belief that a farmer should have some knowledge of business—banking, credits, loans, markets, and marketing, transportation, tariff and taxation; of planning farms and farm work; of the right relation between capital invested, maintenance costs, and revenue. Hence a course in Rural Economics is given, including farm accounting. The farmer should be able to write a creditable letter and to deliver a creditable speech, therefore, courses in composition and public speaking are offered.

THE FOUR-YEAR COURSE

There is nothing to prevent a young man who intends to farm, who has sufficient high school education, and who wishes to secure a college degree, from taking the four-year course. He might not become any better farmer than if he had taken only the two-year course, but he stands a better chance of becoming a prominent citizen and a leader in his community and in the nation.

The four-year course, however, is specially devised to meet the demand for specialists in field husbandry, animal husbandry, horticulture, dairying, poultry, agricultural chemistry and biology. This demand comes from colleges that require teachers and investigators; extension services that require local representatives; Departments of Agriculture that require men to administer their various branches and to carry on the work of their experimental farms; and agricultural journals that require reporters and editors. Those who employ these specialists, as well as those who teach them, are now pretty well agreed that the training required consists of a high school course leading to matriculation, followed by a four-year course at an agricultural college consisting of English, Natural Science, Economics, and the various branches of agriculture.

MR. JUSTUS MILLER RESIGNS

JUSTUS MILLER, B.S.A., recently resigned his position in the Ontario Department of Agriculture to enter upon commercial work. After being engaged for some time in agricultural journalism, Mr. Miller joined the provincial Department of Agriculture three years ago as Assistant Commissioner. Later he

was made Field Crop Specialist. An outstanding feature of his work had to do with the improvement of the potato industry. The standardization of varieties, the inspection and control of disease, the popularizing of the use of Northern Ontario seed, were the main points on which Mr. Miller centred his efforts.

THE VETERINARY PRACTICE BOARD

AT the session of the Ontario Legislature for 1920, a Bill was passed providing that after this year no one can practice veterinary science in Ontario, excepting specified common practices, without a certificate from the Minister of Agriculture. It is further provided that these certificates shall be granted only on the recommendation of a Board to be appointed by the Lieutenant-Governor in Council. In accordance with the terms of this Act, the following Board has been appointed:—Dr. C. D. McGilvray, Principal, Ontario Veterinary College; A. G. Farrow, breeder of Short-

horn cattle and Oxford sheep, Oakville; C. W. Gurney, breeder of Belgian and Percheron horses and Shropshire sheep, Paris, Ont. The Board is representative of the veterinarians, the horse interests, and the cattle interests. Certificates may be granted to graduates of the Ontario Veterinary College, or any other college of equal standing, and also to any one who, without this training, has been habitually practising veterinary science for a living in Ontario for a period at least five years prior to the passing of the Act. Applications must be addressed to the Chairman of the Board.

MANITOBA

POTATOES, UNIFORM AND CLEAN

BY GEO. BATHO, ASSOCIATE EDITOR AGRICULTURAL GAZETTE FOR MANITOBA

IN order to improve the potato growing industry in Manitoba, the provincial Department of Agriculture has prepared three thousand posters and distributed them to every post office in the province. The main points emphasized are: Purity of variety; restriction of varieties to the four distinct types (the Early Ohio type, Irish Cobbler

type, Beauty of Hebron type and Green Mountain type); production of the same type by all possible shippers at each local centre; elimination of disease; better culture. The present very high price of tubers and the keenness of demand for good "seed" potatoes have awakened a good many people to the possibilities of the potato growing industry in Manitoba.

HORTICULTURAL AND FORESTRY ASSOCIATION

THE Manitoba Horticultural and Forestry Association has this spring adopted a hitherto untried method of interesting its Winnipeg members and friends. A series of noon luncheons have been held in the Y. M. C. A. café, and at each of these some timely topic has been discussed in a half hour talk. So far the following addresses have been given: Prof. F. W. Brodrick, Agricultural College,—The General Outlook for Horticulture in Manitoba; Prof. H. F. Roberts, University of

Manitoba,—National and Local Importance of the Potato Crop; Mr. H. C. Whellams, Market Gardener,—Growing Tomatoes and Corn; Mr. F. Pugh,—Everbearing Strawberries and other Small Fruits. The attendance at each luncheon has been in the neighbourhood of one hundred. In addition, numerous requests have been received for evening addresses on garden topics to be given before community clubs and other local organizations.

THE NEW PRESIDENT OF THE AGRICULTURAL COLLEGE

JOHAN Bracken, B.S.A., who has been appointed by the Board to the Presidency of Manitoba Agricultural College, was formerly a citizen of Manitoba.

In practical experience in professional training and in natural instinct President Bracken is an agriculturist. Born and raised on a large dairy farm in Leeds County, Ontario, he rose, while yet a very young man, to become its manager. After four years as farm manager, he took the B.S.A. course at the Ontario Agricultural College. Upon graduation he was engaged by the Dominion Seed Branch and for one year was their representative in Manitoba. Then Mr. Bracken moved to Saskatchewan to become Provincial Superintendent of Farmers' Institutes and Fairs, and for two years combined this position with the secretaryship of the Saskatchewan Live Stock Associations and the secretaryship of the Saskatchewan Winter Fair.

After one year of post-graduate studies in American universities, he became professor of Field Husbandry

in the University of Saskatchewan, which position he has held for the past ten years.

During his term as professor he has written twenty-five bulletins and circulars on different phases of western agriculture, and is also the author of "Crop Production in Western Canada."

In his student days he won four scholarships. In the second year he captured the Governor General's medal for general proficiency. In his fourth year Mr. Bracken won the gold medal as best all-round man in the graduating class. He was a member of the first International stock judging team to bring the judging trophy to Canada. He was president of the College Y. M. C. A.; vice-president of the Agricultural College Athletic Association, and for three years captain of the College Rugby team.

He is president of the Western Canada Society of Agronomy, Director of the Canadian Seed Growers' Association, and Foreign Representative of the International Farm Congress.

MOTION PICTURES

BY S. T. NEWTON, DIRECTOR, EXTENSION SERVICE

THE Manitoba Department of Agriculture purchased ten pathoscope motion picture machines to be used generally in connection with the work of the Extension Service. The Department also purchased eight cell batteries for use at places where electric light is not available. In addition to the machines owned by the Department several community clubs and church organizations are in possession of outfits of their own.

During July and August of last year the Pathoscope Company of Toronto manufactured pictures for

the Manitoba Department of Agriculture under our direction on a number of agricultural subjects, including: Destructive Insects, The Gasoline Engine, The Gang Plough, Boys' and Girls' Clubs, The Agricultural Society Fair, Judging The Dairy Cow, Breeding Types at Brandon Exhibition, Alfalfa, Out With The Chickens, and other educational topics.

We had four copies of each of these films made, and in addition we used several Ontario films and a considerable number of the regular ones made by the Pathoscope Company. Also

several manufacturing concerns such as the International Harvester Company, the Portland Cement Company, and the Canadian Explosive Company, provided a number of films of an educational nature suitable for the Pathoscope machine. These have been widely used throughout the province. During the winter of 1919-20 we held agricultural chautauquas at sixty places in the province. These chautauquas extended over a period of two days with afternoon and evening sessions. Motion pictures were usually shown for the first hour at each evening meeting and were followed by an agricultural speaker and another speaker from the University on a general educational topic.

In addition to the chautauqua meetings motion pictures were used at

about one hundred individual meetings in the dairy district between the lakes. The great majority of the people in these districts had never been to a motion picture show, consequently, while the district is rather sparsely settled, the attendance was remarkably large.

Last winter the roads were extremely bad and there was a considerable amount of sickness, but in spite of these drawbacks our meetings were a big success and a considerable part of this success was due to the fact that motion pictures were used. At these meetings we usually ran about five films, two or three on agricultural subjects and the others on travel, general education, and humour.

We are convinced that the motion pictures are a valuable asset in the work which the Agricultural Extension Service is carrying on.

PASSING OF THE PROVINCIAL MINISTER OF AGRICULTURE

THE death was announced on Monday, June 7, of the Hon. Valentine Winkler, Minister of Agriculture for Manitoba. The cause of death was diphtheria, with which Mr. Winkler was seized only two days previously. He had been a member of the Manitoba Legislature since 1892, and had been Minister of Agriculture since May 15, 1915. He devised and developed the policy of providing cows for needy settlers in the rougher districts of the province. This was what was commonly known as "the

Winkler Cow Scheme." The deceased was born at Neustadt, Grey County, Ontario, on March 18, 1864, and was consequently 56 years of age at the time of his death. He moved to Manitoba at the age of fifteen. He received his education at the public schools of Neustadt. He first entered the lumber business, but later took up farming near Morden. He was first reeve of the municipality of Stanley, where the town of Morden is situated. He was a candidate for the House of Commons in 1900 for Lisgar, but was defeated.

SASKATCHEWAN

PROFESSOR MCKAY JOINS CO-OPERATIVE CREAMERIES

PROFESSOR K. G. McKay, who until recently has been professor of dairying in the College of Agriculture, University of Saskatchewan, has resigned from that institution and has accepted a position with the Saskatchewan Co-operative Creameries. In his new capacity he will act as superintendent of a group of Saskatchewan factories. During

his term of service at the College he was eminently successful. He has had wide experience in dairying and has made special studies in the most modern methods of conducting dairies successfully. As an expert on butter he ranks among the best and the Co-operative Creameries have been especially fortunate in securing his services.

BRITISH COLUMBIA

AGRICULTURAL EDUCATION FOR SOLDIERS

MR. F. M. Clement, Dean of the College of Agriculture in the University of British Columbia, has forwarded for THE AGRICULTURAL GAZETTE the following article prepared by Mr. F. A. Fink, a returned soldier, that accurately describes the course given at the University last winter for returned soldiers. Mr. Fink's statement is as follows:

"Seventy-eight returned soldiers who took the agricultural course provided by the University, commenced their three months' course on the 6th of January. The men were divided into three main classes. Each class carried on for one month and then changed. The first class comprised agronomy and poultry and general outside farm work. The second class took up horticulture in theory and practice, and entomology. In addition, three mornings each week were devoted by this class to blacksmithing and carpenter work. The third class received instruction in animal husbandry and dairying. Arrangements were made for voluntary classes to receive instruction on four evenings of the week in the blacksmith and carpenter shops.

"At the beginning of the course the men organized themselves with a president, secretary, and two others to act as a committee with power to take up matters that needed adjustment. We established a canteen, each student contributing \$1.00 towards necessary stock. The Young Men's Christian Association of the University provided books and games. A circulating library was organized. Entertainments were provided weekly.

"The section I was in started with agronomy and poultry. Lectures commenced at nine o'clock and continued until noon. In agronomy the subjects covered the origin of soils, drainage, conservation of moisture,

fertilizers, cultivation, crop rotations, seed selecting and testing, seeding, harvesting, and storing, varieties of grain, grasses, clovers and hoed crops, soils and fertilizers suitable for crops of various kinds, and further kindred subjects. The lectures resumed for one hour after dinner, then practical farm work was undertaken. We took turns on farm work on the land, which included ploughing, discing, harrowing, rolling etc., and we were even taught to kill, scrape, and dress pigs. We were taught practical drainage and the use of surveying instruments. We were also shown how to handle carpenter's tools, fell trees, and use blasting powder in the blowing out of stumps.

"For convenience the poultry class was divided into four sections. Each section took charge of four laying houses alternately. This arrangement gave each member of the class one week on poultry for each section. The sections were sub-divided into pairs, two students being allotted to each pen of about one hundred hens. After preliminary instructions were given the care of each pen was left entirely to the students with supervision. The feed was weighed and distributed, and egg records were kept. At the end of the week these were totalled up by the students, the percentage of eggs laid worked out, their market value established according to their grade, and the profit from the pen was ascertained. Practical demonstrations in culling were given and the students were expected from the appearance of the birds toward spring to judge about the number of eggs they had laid.

HORTICULTURE AND ENTOMOLOGY

"The horticultural lectures were very popular. Practical work followed immediately after the lectures, that is to

say, when the lectures were on strawberries, loganberries, raspberries, or gooseberries, the class would then be taken to the fruit farm to receive practical demonstration of pruning, propagating, grafting, and other work. Supervisors were always with the class to direct the work and correct errors. The students made their own hotbeds, prepared flats, did the seeding, pricked off and transplanted the young plants, and afterwards looked after them.

"Biology was studied side by side with entomology. We learned the life history of insects and fungi, and the best means to deal with them. We studied the various sprays and other compositions and noted the importance of knowing what to spray for.

ANIMAL HUSBANDRY AND DAIRYING

"The animal husbandry and dairy class was divided into two sections, one working half the month in the dairy. From two in the afternoon until the evening the other half worked in the barns where the horses and cattle were housed. The lectures each morning were on live stock,

which included horses, dairy cattle, swine, and sheep. After the lectures demonstrations were given in judging the classification of animals according to standard. This work was done in the barns and sheds. We were given the opportunity of treating sick animals, including the use of milk fever apparatus. The live stock studies included milking. The half of the class that worked in the dairy in the afternoon were taught how to test milk, cream, skim milk, and buttermilk, for the fat content. We were taught cheese making and butter making and the running of separators. From one to two o'clock the lectures were on purely dairy matters, which included factors that cause milk and cream to sour, butter to go off in flavour, the constituents of milk, importance of milk as a food, pasteurizing, sterilizing, chemical tests, ice-cream making, and other phases of dairying.

"The course concluded with a dinner at which the students expressed their gratitude for the attention given them, while the professors and instructors gave valuable advice for their guidance on entering upon farming as a life work. A concert followed the supper."

ASSISTANT PLANT PATHOLOGIST

THE appointment of Mr. E. S. Coward as assistant to Mr. J. W. Eastham in the plant pathological laboratory, Vancouver, B. C., is announced. Mr. Coward is a graduate of Queen's University and has recently been taking agricultural studies at the University of British Columbia. His appointment will enable Mr. Eastham to give more time

to field work in connection with the control of various potato and other plant diseases, which has been his special work during the last few years.

It is probable that in conjunction with Mr. Cecil Tice of the Soil and Crop Division experimental spraying for late potato blight will again be carried out in certain districts of the Lower Fraser Valley this year.

PART III

Junior Agriculture

DEMONSTRATIONS, COMPETITIONS, AND CLASS-ROOM STUDIES IN RURAL
LIFE FOR BOYS AND GIRLS

THE SCHOOL GRASSHOPPER CAMPAIGN

MANITOBA

BY GEO. BATHO, ASSOCIATE EDITOR, AGRICULTURAL GAZETTE, FOR MANITOBA

LAST year there was a serious grasshopper outbreak in South-western Manitoba and South-eastern Saskatchewan. The Manitoba Department of Agriculture and Education seized upon the possibility of another outbreak this spring as the occasion for combining some nature study with a campaign for grasshopper eradication. A series of five lessons on the grasshoppers has been printed and sent in quantity

to every school teacher in the infested area. These lessons were written by A. V. Mitchener, Lecturer on Entomology in the Manitoba Agricultural College, and they are prefaced by a note from Hon. Dr. Thornton, Minister of Education, asking for the co-operation of teachers in presenting the lessons. The lessons cover the life history of the locust, and indicate methods of control.

SASKATCHEWAN

BY J. B. BOOTH, CHIEF FIELD DIRECTOR, GRASSHOPPER CAMPAIGN

IT was realized early in the season by the provincial Department of Agriculture, that Saskatchewan was likely to be infested with a bad outbreak of grasshoppers during the spring and summer of 1920. The outbreak of last year, together with the evidence of egg laying in very many districts, was sufficient grounds for this assumption. A strong organization was formed in connection with the provincial Department of Agriculture and extended to the rural municipalities. It was realized that an important part of such an organization must be the education of the farmers of the province up to the real seriousness of the grasshopper menace. To accomplish this, in addition to holding public meetings in the school houses,

towns, and municipal centres, a campaign was got under way to interest the school children.

An article was published in *The League News*, a publication that goes out every month to the school children of Saskatchewan, telling them something of what was expected this season, and asking them to be on the lookout for outbreaks of grasshoppers in their going and coming from school, and in their spare moments when scouting about the pastures and fields. Following this up, a short time later, a circular and coloured poster giving in a general way the details of what to look for, and how to handle an outbreak of grasshoppers, were sent to all the schools. To further supplement this information, it was arranged that each

of the Field Directors of the Department of Agriculture who is in charge of four municipalities, should personally visit the schools in his district and give a talk to the children on this pest.

This was done some time ago, and very gratifying results have been obtained during the past few weeks. We found a lively interest on the part of the school children, and a very earnest desire on the part of

the teachers to assist us in this work. It is due to the work of the teachers and the students that many farmers have been put on their guard as to what to look for, and how to proceed should an outbreak occur on their farm. In nearly all of the school districts of the infested area, children are acting as scouts in the grasshopper campaign with very satisfactory results.

NOVA SCOTIA

SHORT COURSES IN HOME ECONOMICS

A SHORT course in home economics will be given at the Nova Scotia School of Agriculture, Truro, in July. This course will be open to Nova Scotia girls between the ages of 12 and 18 years. Classes will be held daily in the Science building, and special attention will be given to food values, canning, and cookery.

The arrangements are that the girls will secure rooms in the neighbourhood and will prepare and serve

their own meals at the College as part of their practical instruction. In this way it is hoped that the cost per week will not exceed \$6. The present regular boarding rate in Truro is from \$9 to \$10. Tuition at the college is free.

The girls will be under the care of competent instructors throughout the course, the first period of which will run from the 6th to the 16th of July. If the first period is well patronized a second will be arranged for which will run from July 2nd to 30th.

ONTARIO

VISITORS FROM TEXAS

ONE hundred and fifty Texas farm boys aboard a special train will tour Ontario during August. The boys get this trip as a prize award for winning contests on corn, grain, and cotton growing and stock raising. All expenses of each passenger are paid, and no boy is allowed to make the trip unless he qualifies as a prize winner. This tour

is under the direction of the Texas Chamber of Commerce and the Texas A. and A.M. College.

Stops will be made at all agricultural colleges and experimental stations and the more notable farms on route. After a short trip in Canada the boys will return to the United States and visit several American states and places of historical interest.

MANITOBA

PROGRAMME OF 1920 CLUB WORK

CLUB work for boys and girls in Manitoba will be carried on in close co-operation with the Department of Education, the Agricultural College, and the various farmers' and women's organizations in the province, as in previous years, and financed by the grant made to the province under *The Agricultural Instruction Act*.

No radical changes from last year are contemplated. One departure, however, is perhaps worthy of mention and that is the team demonstration and judging work on which the provincial championship trips will be based. Arrangements have been made to train demonstration teams in each inspectorial division. These teams will each consist of three club members, a leader and two assistants already enrolled in one or more of the specified projects or contests. The subjects in which demonstrations will be given are,—canning, dyeing, bread baking and the preparation of school lunches. The demonstration work is planned especially for the girls, but boys are not debarred, and it is altogether likely that when the winners are announced, there will be several boys named in the list.

Each member of the team will be familiar with every phase of the subject, and while the leader is giving a history of the subject under consideration, her team mates will be preparing for the practical work connected with the demonstration, and later on each one will take her place and explain her particular part of the work.

The main purpose of the demonstration is to develop in club members self reliance, self confidence, and the ability to describe the work which they are doing. Demonstration work also makes it absolutely necessary that each demonstrator is familiar with all phases of her subject.

The special work provided for the boys is stock judging, poultry and vegetable judging. Very naturally most of the champion teams will come from districts in which agricultural representatives are located.

The provincial championship trips for boys will be based, half on the ability of the competitors to judge live stock, and half on the score obtained on the animals which they own and are caring for.

No free or partially free supplies are provided, but lists of farmers, who have pure-bred live stock and poultry and pure seed grain are kept on file for the benefit of those who wish to purchase better stock.

In addition to providing judges for all of the fairs, the Department of Agriculture supplies monthly instruction circulars for each teacher, judges' books, prize cards, entry tags, and posters advertising the fairs. Annual financial statements are sent to the Extension Service by the various clubs; consequently to all intents and purposes the boys' and girls' clubs are on the same financial basis as the agricultural societies. In fact, practically all the school exhibits formerly provided for in the Agricultural Society prize list have been transferred to the boys' and girls' clubs. There is, therefore, no duplication of prizes.

Last year eighty-one clubs took advantage of the Bankers' Competition, and this year each of the 250 clubs is complying with the terms of this competition.

Two members of the Extension Service Staff, H. E. Wood, B.S.A., and Margaret Speechly, B. H. Ec., devote all their time to boys' and girls' club work. In addition some of the senior year girls from the Agricultural College who have had

considerable experience in teaching, will assist during the summer months in training club members in canning, cooking, dyeing, etc. They will also assist in judging at the boys' and girls' club fairs.

As the agricultural fairs nearly all come in July and August, and the boys' and girls' club fairs in September and October, no difficulty is met with by reason of one encroaching on the other.

SASKATCHEWAN

FARM BOYS' CAMPS

TWO farm boys' camps are being held in Saskatchewan this summer—one at the Saskatoon exhibition on July 13th and the other at the Regina exhibition from the 27th to 29th. The programme at Saskatoon consists largely of work on crops, while that at Regina will chiefly deal with live stock. Teams of five boys between the ages of 14 and 17 years may attend these camps for two years, thus enjoying the advantages of the full course of instruction. This year teams attending the Saskatoon camp will consist of boys of fifteen to seventeen years who previously attended the Regina camp.

In addition to this, however, teams will be accepted of boys from fourteen to sixteen who have not previously attended the Regina camp, but only from agricultural societies which did not in 1919 send a team to the Regina camp. That is societies which have not recently taken any part in the camp movement may send a team this year to whichever camp they prefer, or better still a team to each camp. John G. Rayner of the Extension Department of the College of Agriculture, Saskatoon, is director of the camps and has made the necessary arrangements for the course.

BRITISH COLUMBIA

THE PROGRESS OF RURAL EDUCATION

BY J. W. GIBSON, M.A., DIRECTOR, ELEMENTARY AGRICULTURAL EDUCATION

INTEREST in rural education is steadily growing. The country life movement, which for many years has barely managed to keep alive and which has always been more or less confined to a discussion of theories growing out of the publication of statistics relative to our rural population, now seems to be gathering force. This revival of interest in rural affairs is widespread in Canada and the United States, and is manifesting itself generally in improved methods of production, better business management, and a desire on the part of the farming population for greater participation

in the affairs of the country at large. With this rural awakening there is bound to come a greater appreciation of the value of education, and consequently dissatisfaction with the old form of rural school organization—the ungraded country school. Already in certain parts of the province the movement towards improvement in education through re-organization and consolidation of school districts is well under way. On Vancouver Island the municipalities of Duncan and North Cowichan have been united for school purposes, and have got off to a very good start. Four of the one-roomed schools of

North Cowichan—those nearest to the city of Duncan—were closed, and the pupils are being transported in vans to the central school at Duncan. The consolidation of the municipality of Spillamaheen with the city of Armstrong for school purposes has also been effected, and steps have been taken to erect a new school at Armstrong to accommodate all of the children attending school from both city and municipality. More recently the question has come up for discussion at Chilliwack, and there seems to be a growing sentiment throughout the city and the adjoining municipality in favour of a complete re-organization of their local system. In several other districts the same problem is being faced and is receiving serious consideration. "Better education under improved conditions" seems to be the main thought in the minds of people everywhere who think along educational lines, or who manifest any sign of interest in the future welfare of the country.

This re-organization of rural schools will undoubtedly result in improved instruction in all branches, but it will be particularly advantageous in connection with the teaching of elementary agriculture, manual training, and domestic science. Under the new system it will be possible to have such up to date equipment and such improved conditions for teaching these special subjects as are obviously impossible under the old system of small, ungraded schools. With the enlarging of the unit of organization for rural consolidated schools and the added facilities for better teaching, will also come an ever-enlarging field of usefulness for the school itself. Courses of instruction will be improved and brought more into harmony with the best life and interests of rural people, the people themselves will find new avenues of educational and social interest opening up for them, and these will all centre around their most important institution—the school.

"We were founded as a nation of farmers, and in spite of the growth of our industrial life, it still remains true that our whole system rests upon the farm; that the welfare of the whole community depends upon the welfare of the farmer."—Theodore Roosevelt.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications, and Notes

THE CITY MILK SUPPLY

REPORTS FROM LEADING CITIES IN EIGHT PROVINCES

THE milk supply of Montreal City was carefully studied several years ago from a bacteriological standpoint by Messrs. Harrison, Savage, and Sadler of Macdonald College, Quebec. A report of their findings was published in a Macdonald College bulletin which showed clearly the reasons for undertaking the investigation, explained the methods, stated milk standards used, and gave recommendations for the guidance of persons interested in the city milk trade. In THE AGRICULTURAL GAZETTE of Canada for February, 1915 (Vol. II, No. 2, page 142), a report of this investigation was published.

Since that time an effort has been put forth in other Canadian cities to improve the milk supply, which is of such importance to human life in thickly populated centres. A number of the cities of Canada have made an attempt to improve the herds, farms, milk depots, transportation media and equipment used in the milk business. In many cases the results have been gratifying.

Following up the findings of Dr. F. C. Harrison and his associates, THE GAZETTE has endeavoured to secure data from other large Canadian cities in the interests of better milk. With this object in view a questionnaire was sent out to the cities of major importance. The questions were intended to be suggestive rather than interrogative, and in some cases the officials treated

them as such, supplying full data and valuable information, while in other cases "yes" and "no" were the main replies. However, considerable information of value has come to hand and is treated in the paragraphs following:

QUESTIONNAIRE

The circular contained eleven questions as follows:—

1. What are your standards as to
 - (a) Butter fat ?
 - (b) Total solids ?
 - (c) Bacteria per cubic centimeter ?
2. What kind of public control is exercised over milk distribution, from the standpoint of,
 - (a) Sanitary protection—
 - (b) Delivery service—
 - (c) Dairy farm inspection—
3. What classes of milk are recognized ?
4. What percentage of milk is sold as certified ?
5. What are the requirements *re* pasteurization and at what temperature and exposure is pasteurization done ?
6. Have you a municipal laboratory ?
7. How much milk is consumed daily, per capita ?
8. Have you a Sunday delivery ?
9. From how large a radius of miles surrounding your city is the milk supply drawn and what is the maximum of time that elapses between the milking and the delivery ?
10. What are your requirements *re* tuberculin test ?
 - (a) By whom is the test conducted ?
11. Do milk producers have to obtain a license to sell or ship milk to your city ?

IN NOVA SCOTIA

Twenty-five cities in different parts of Canada responded with the required information together with copies of by-laws governing the milk trade. From these replies, and from a perusal of the by-laws, it is evident that many cities are putting forth honest efforts to protect the consumer against the carelessness of producer and dealer. In some cases assistance and encouragement are meted out to those engaged in the production and distribution of this commodity.

From Nova Scotia two replies were received indicating that in Truro and Halifax persons engaged in the milk supply business must secure a permit licensing them to carry on. The by-laws in each case point out clearly the responsibility of the milkman and the penalty in case of transgression. The Health Board of the city of Halifax prepared a poster for use in prominent places on the premises of dairymen and dealers. The suggestions contained in this poster are worthy of consideration by all persons engaged in the milk trade. For this reason they are given in full as follows:—

THE BARNYARD

1. It should be well drained clean and dry and should be as much sheltered as possible from the wind and cold. There should be no pools of stagnant water or urine therein.
2. Manure should not be allowed to collect in the barnyard and should not be at any time in contact with the stable or milk-house.

THE STABLE

1. Cow stables should be well lighted and ventilated. The ventilation should preferably be from the top.
2. There should be at least 400 cubic feet of air space for each cow, otherwise extra ventilation should be provided.
3. Walls and ceilings should be kept clean. The stable should be whitewashed twice a year, and more often if necessary.
4. It is desirable that the place where the cows are kept be used for no other purpose. A cow barn should not be used as a storage place for straw, hay or other feeds, or as

a wagon or tool house, as the dust and dirt which accumulates in a place of this character is liable to drop into the milk while it is being drawn from the cow.

5. The ceilings should be so constructed that dust and dirt therefrom shall not readily fall to the floor or into the milk. If the space over the cow is used for storage of hay, the ceiling should be made tight to prevent chaff and dust from falling through.

6. Stable floors should be made tight and smooth and be of some non-absorbent material. Dirt or earth floors and gutters cannot be tolerated.

7. The flooring where the cows stand should be short enough so that all manure will be dropped into the gutter and not upon the floor itself.

8. The floor should be swept every day, but not before milking.

9. Cement gutters and mangers are the best, as they can be more easily kept clean than if made of wood.

10. The manure gutter should be from six to eight inches deep and should be kept at all times fairly free from manure.

11. Manure should be removed from the stalls and gutters before the morning milking and also before the afternoon milking, where the cows remain in the stable all day.

12. The use of land plaster or lime is recommended in the gutters.

13. Allow no strong smelling material in the stable for any length of time. Store the manure under or outside the cow stable and remove it to a distance as often as practicable.

14. If individual drinking basins are used for the cows they should be frequently drained and cleaned.

THE COWS

1. The cows should be kept clean and be free from disease.
2. Have the herd examined at least twice a year by a skilled veterinarian. Never add an animal to the herd until certain it is free from disease, especially tuberculosis.
3. Promptly remove from the herd any animal suspected of being in bad health, and reject her milk.
4. The cows should be groomed daily, and all collections of manure, mud or other filth should not be allowed to remain upon their flanks, sides, udders, or bellies.
5. The clipping of long hairs from the udder and the right side of the cow is of assistance in preventing the collection of filth, which may drop into the milk.
6. The hair on the tails should be cut so that the brush will be well above the ground.
7. The cows may be bedded with sawdust, shavings, leaves, straw, or some equally clean material.

8. The use of horse manure for bedding is to be condemned. Sand or loam must never be used as bedding.

9. To prevent the cows from lying down and getting dirty between cleaning and milking, a throat latch of rope or chain should be fastened across the stanchions under the cow's neck.

THE FOOD

1. Feed liberally, and use only fresh, palatable feed stuffs, in no case should strong smelling or decomposed or mouldy material be used.

2. Do not allow any strong flavoured food, like garlic, cabbage, and turnips to be eaten by milch cows.

3. Provide water for cattle in abundance, easy of access, always pure and fresh.

4. Salt should always be accessible.

THE UTENSILS

1. Milk utensils for farm use should be made of metal and well tinned, and have all joints smoothly soldered. Never use them if they become rusty or rough on the inside.

2. Dairy utensils should be cleansed directly after using by first thoroughly rinsing them in water; then clean inside and out with hot water in which a cleaning material is dissolved; then thoroughly rinse with plenty of water; and lastly, sterilize by boiling water or steam. Use pure water only.

3. All milk utensils and strainers should be thoroughly cleansed by the use of boiling water, and all cans, utensils and strainers must be sterilized before they are used.

4. Milk strainers should be kept exceedingly clean, and scalded a second time just before using. If cloth strainers are used, several of them should be provided in order that they may be frequently changed during the straining of the milk.

5. After cleaning, utensils should be inverted in pure air. Milk utensils and cans must not be left in the cow stables, by the dusty roadside, near the sink drain outlet, and pig sty or the open privy vault.

6. Ice tubs and cooling tanks should be thoroughly cleansed by scrubbing at least once a week.

7. Remember that the milk cans must not be used to carry water for cattle or for other uses on the farm.

THE MILK AND MILKERS

1. No person having any communicable disease, or one caring for persons having such disease, should be allowed to handle the milk or milk utensils or assist in the milking.

2. The hands of the milkers should be carefully washed immediately before milking.

The hands should be thoroughly washed with soap and water and carefully dried on a clean towel.

3. Milk with dry hands; never allow the hands to come in contact with the milk. The practice of moistening the hands with milk, or to spit on them, is to be condemned.

4. The milker should wear a clean washable jacket, used only when milking, and kept in a clean place at other times.

5. Always brush off and wipe the udder and surrounding parts just before milking. If the cows are very dirty, wash with a cloth or sponge, and then dry the udders and teats with a clean piece of cloth or sacking.

6. Milk quietly, quickly, cleanly, and thoroughly.

7. The first few streams from each teat should be rejected, as this milk contains more bacteria than the rest of the mess.

8. All milk drawn from the cows 15 days before and 5 days after calving shall be rejected, and also all milk from diseased cows. If any accident occurs by which a pail full or partly full of milk becomes dirty, do not try to remedy this by straining, because the soluble filth and the bacteria cannot be removed by straining, but reject all this milk and rinse the pail.

9. The pails in which the milk is drawn should have as small an opening at the top as can be used in milking. This renders the collection of manure and dust with the milk, less likely.

10. Dry fodder should not be fed to the cows during or just before milking, as dust therefrom will fall into the milk.

THE MILK

1. Remove the milk of every cow at once from the stable to the milk house or to a clean room where the air is pure and sweet. Do not allow milk cans to remain in stables while they are being filled.

2. A good plan, if modern coolers are not available, is to strain the milk into cans which are standing in ice water which reached the neck of the can.

3. The more rapidly the milk is cooled and the colder it is kept the safer it is, and the longer it will remain sweet. Milk cannot be properly cooled at any season of the year if the air alone is expected to do the cooling.

4. Ice should be used in cooling, both in summer and winter, as very few wells or springs are cold enough for the purpose.

5. If aerators or coolers are used, they should stand where the air is free from dust and odor, and on no account should they be used in the cow stable.

6. Milk should always be cooled as soon as strained. If modern apparatus for airing and cooling at the same time is not at hand,

the milk should be aired by tipping the covers slightly while cooling the milk to 50 degrees F. in clean ice water. Precautions should always be taken to see that the water is above the milk to be cooled in the cans, and that the water cannot overflow into the cans and water the milk.

7. Never ship a can containing warm milk which has not been cooled and aerated.

8. If the milk is held at the farm it should be stored in fresh, cold ice water, or kept in a running spring.

9. The milk should be kept under shelter so that the rain cannot get into the cans.

10. Never mix fresh warm milk with that which has been cooled.

11. During the transportation of the milk and cans to the car or dairy, covered wagons only should be used. If this is not possible the cans should be protected from heat, cold, dust and mud by a clean canvas or blanket.

12. All milk must be rapidly cooled and continuously maintained at a temperature below 50 degrees F.

IN NEW BRUNSWICK

Both Fredericton and St. John in the province of New Brunswick reported the requirements demanded in their city by-laws. The standards in both cases are almost identical. In each case butter fat requirements are 3.25 per cent, while the total solids are 11.75 per cent and 12 per cent respectively. Control over milk distribution is exercised by inspectors, who investigate the conditions of the dairy farms, dairies, etc., and collect samples from the farm milk cans, or from other vessels in which the milk is delivered. The bottling is done under sanitary conditions and frequent inspections of the premises are made. Tuberculin tests of cattle are conducted when necessary by qualified veterinarians. Milk producers supplying Fredericton require a license to sell or ship milk to the city. In St. John the milk vendors are licensed. In the first-named city the examinations are made in a private laboratory, while the latter city has a municipal laboratory.

IN QUEBEC

Quebec, Montreal, and Sherbrooke are the representative cities of the province of Quebec furnishing

information on this subject. The standards in each case vary slightly, the butter fat content being 3 per cent for the two latter and 3.25 for the former city. The total solids required are 11.75 per cent, 12 per cent and per cent respectively. No standard with reference to the number of bacteria per cc. is specified. Through careful inspection of the premises of producers and dealers by men appointed to carry out this work, and assisted, where necessary, by the police to investigate complaints, ample protection is afforded the consumer.

Three classes of milk are recognized in Sherbrooke, namely, raw, pasteurized, and certified. In the other two cities the classification is not emphasized, but Montreal has provided for this in a new by-law at present before the city council. In most cases the pasteurization requirements are 145 to 150 degrees F. held for thirty minutes, and immediately cooled to 45 degrees F.

The federal requirements with reference to the tuberculin test are supplemented by municipal by-law in the case of patrons shipping milk to Quebec City. Montreal has no special by-law, while the demands of the Sherbrooke patrons only affect those supplying certified milk, which amounts to about 4 per cent of the total milk supply for that city.

IN ONTARIO

Eight Ontario cities provided information concerning their milk supply. The twin cities of Port Arthur and Fort William recognize the provincial standards with reference to butter fat, total solids, and bacteria. Periodical inspection of both dairy farms and milk depots is made by sanitary inspectors. No certified milk is supplied in either city, but Port Arthur recognizes two classes, raw and pasteurized, and requires that pasteurized milk be held at 70 degrees C. for 20 minutes.

This city also demands that tuberculin test be made of all dairy cows by a veterinarian under the direction of the federal Government. The Fort William authorities recently issued a circular containing suggestions, hints, and warnings, and sent these to all parties engaged in supplying milk to the city. The details of this circular are embraced in the poster issued by the city of Halifax and already reproduced in this article.

The cities of London and St. Thomas have regulations that contain many points in common. Their standards are identical. Vendors before selling in these cities must secure licenses, for which a fee is charged. They must also apply to have their cattle, premises, and equipment inspected, and agree to observe the provisions of the corporation by-laws before receiving a permit enabling them to conduct business.

Hamilton, Toronto, Ottawa, and Guelph were the other Ontario cities reporting. Their by-laws and regulations correspond very closely with those of the cities before mentioned. In every case it was difficult to report on the amount of milk consumed daily *per capita*, the reason for this being that a number of citizens, especially on the outskirts of the cities, keep their own cows and in some cases supply their neighbours. Even an approximate estimate cannot well be made because of the use of powdered and condensed milk in many households.

The city of Toronto specifies that the bacteriological count shall not exceed 250,000 per cc. in winter, or 500,000 per cc. in summer, also that all milk must be sold in bottles.

The pasteurization requirements in Ontario, as defined in the provincial Milk Act, demand that the milk be held at 140 degrees to 150 degrees F. for twenty to thirty minutes and cooled at once to 45 degrees F.

IN MANITOBA

Winnipeg and Brandon report rather fully, while Portage la Prairie makes the statement that the regulations of that city call for $3\frac{1}{2}$ per cent butter fat, and that cows be subjected to the tuberculin test. In the latter city more than half of the people have to use condensed milk, owing to the scarcity of the raw product.

Winnipeg has a Sunday delivery, which is also true of practically all the cities reporting, with the exception of Brandon and Ottawa. In Ottawa there are two deliveries on Saturday but no Sunday delivery, while in Brandon the Sunday delivery is not general.

IN SASKATCHEWAN

The reports for Saskatchewan are from Regina, Saskatoon, and Moosejaw. The standards for the first-named city are 3.25 per cent butter fat and 12 per cent total solids. For the second, 3.5 per cent butter fat and 12 per cent solids, while for the last the requirements are 3.25 per cent butter fat and 11.75 solids.

Regina stipulates that milk must be properly treated and handled at the point of production. As soon as it is drawn it is removed to the milk house, strained, and cooled. Milk must not leave the farm or be sold at a temperature above 50 degrees F. It must be shipped in sanitary milk cans and retailed in bottles. All milk is retailed in covered waggons, which are clean, fly proof, dust proof, and frost proof. The dairy farms supplying milk to Regina are periodically inspected. Barns and milk houses must comply with the regulations laid down in the dairy bylaw. The cleanliness of the milk is ascertained by frequent bacteriological counts and sediment tests. Three classes are recognized, first, certified, second, milk from tuberculin tested herds, and, third, pasteurized milk. About five per cent

of the milk sold is certified. The laboratory work is carried out by arrangement with the laboratory at the Regina General Hospital. The tuberculin test of the dairy animals is carried out under regulations issued by the Veterinary Director General governing municipal dairy testing, and the test is conducted by officials of the Dominion Health of Animals Branch.

Milk vendors in the city of Regina secure a license costing five dollars, while the dairies authorized to ship milk to a pasteurizing plant are supplied with a permit free.

The report from Saskatoon indicates that that city supervises the milk supply quite as carefully as does Regina. It demands that all dairy farms conform to the city regulations before licenses are granted. The tuberculin test is applied to the herds and regular inspections are made by the inspector in charge. A score card is used showing methods and equipment used by the dairyman. At any time these do not prove satisfactory, his name is removed from the list and his license is cancelled. This practice is also observed in the case of a number of the cities in Eastern Canada. The pasteurizing depot, according to the Saskatoon regulations, must be of good construction, located on sewer and water mains, contain not less than three compartments, namely a handling room, a wash-room, and a storeroom, all with concrete floors. Before operating, the plant must secure a permit and the equipment must be satisfactory. No raw milk can be sold from the pasteurizing depot. The system of pasteurizing is practically the same as that adopted by other cities, namely the "Holding System".

It is stipulated in the Saskatoon regulations that the dairy barns must have not less than two square feet of window glass per animal. The floors must be of satisfactory material and substantial. Not less than four hundred cubic feet of air space

per cow is permitted, and one square foot of air outlet through the roof for every ten head, and inlets to admit fresh air of equal amount, is demanded. These requirements all go under the head of tuberculin inspection, and the tests are carried out by veterinary inspectors of the federal Department of Agriculture.

IN ALBERTA

The standard required by the Alberta Public Health Act for the milk supply to cities is butter fat 3 per cent and total solids 12 per cent. Three cities in Alberta reported, namely, Edmonton, Calgary, and Lethbridge.

Edmonton has an efficient inspection service, and all milk utensils and premises are periodically inspected each year. During about ten months of the year practically all the milk is hauled into the city by the producers, who are licensed to sell or ship the milk if their premises upon examination are considered satisfactory.

The inspection service in Calgary is very similar. Three classes of milk are recognised, namely, raw, pasteurized, and nursery milk, which compares with certified milk. The milk for Calgary comes from a radius extending eighty miles; while for Lethbridge thirty miles is the most distant point from which milk is shipped, there being a depot in a small town that distance away at which milk is pasteurized and shipped in by train.

IN BRITISH COLUMBIA

From British Columbia only one report was received, that from Vancouver. The standards there are butter fat, 3.25 per cent, total solids, 11.75 per cent, bacteria maximum, 750,000 per cc. and pasteurized 15,000 per cc.

The public control exercised over milk distribution is stated in detail. A qualified inspector daily visits and inspects the dairies in the city, maintaining cleanliness in utensils, machinery, and premises. Samples of milk are taken for bacterial and chemical examination. Waggon are also subject to daily inspection, and from them samples of milk are secured for chemical and bacterial tests. This work is also carried on at the farms by the provincial Government inspector acting under control from the seat of Government. The Vancouver authorities are endeavouring to recognize only one class of milk. They consider this essential because no matter from which dairy the milk is obtained, they must be confident that the milk is pure, clean, obtained from disease-free herds, supplied in sterilized bottles capped by machinery. They also consider that if people want milk other than the one standard it is for the consumers to manipulate it as they require. The authorities act on the principle that if a person likes his food, such as meat, in a state of highness, it is not for the butcher to keep it until it is ripe, but for the purchaser; if also milk is preferred sour, or inoculate, it is the consumer or householder who should bring about the conditions required. At one time approved milk was on the Vancouver market, but owing to its higher price it was used only by the people who could afford to pay, and those who should have benefited could not do so, owing to the higher cost.

No certified milk is sold in Vancouver, because the requirements for certified milk production in British Columbia are prohibitory from the standpoint of cost, and the inability to obtain the right kind of farm help. Ninety per cent of the milk is pasteurized, although this is not compulsory. The method is as follows: The milk passes through a strainer into the receiving vat, then through

the clarifier and the pasteurizer, where it is raised to a temperature of 142 to 145 degrees F. It is held at this temperature while passing through the holder for thirty minutes, and then goes to the water cooler. From here it passes to the brine cooler and to the filler, from which the full bottles pass to the machine capper. It is finally put into the cold room ready for delivery.

Vancouver has both chemical and bacterial laboratories municipally owned. It is estimated that .065 gallons per day *per capita* is consumed as milk (this does not include cream or its equivalent as milk). This estimate has been found very nearly correct by division of the milk as put out by the total population.

It is required that evidence be produced to the proper department of the city that herds supplying the city with milk have been tested within the past twelve months. The provincial Government have veterinary inspectors travelling the farm districts and testing cattle. Those animals giving positive reactions are condemned, while the herds that pass the test receive from the provincial inspector a certificate showing that the cattle have been tested and are free from disease; also showing in what class they are placed. There are three classes, A., B., and C.

The milk producers in British Columbia do not require a license to ship milk into the city, but producers wishing to sell milk in the city must first take out a license which, however, is not granted until the farm premises are inspected by the city inspector, who satisfies himself as to the adequacy of the equipment provided and is assured that in all respects the city bylaw is complied with. The authorities of Vancouver are of the opinion that to license producers supplying milk to municipalities is beneficial, providing that such licensing is only nominal and not for revenue-producing purposes.

The radius in which milk is gathered into the different cities varies considerably, but throughout Canada, except in the case of the larger cities, where the maximum radius is

about one hundred miles, the milk is gathered only for a distance of from ten to twenty-five miles, depending on the means of transportation.

INTERNATIONAL CONFERENCE OF REPRESENTATIVES OF ORGANIZED FARMERS

BY N. P. LAMBERT, SECRETARY CANADIAN COUNCIL OF AGRICULTURE

Representatives of the Canadian Council of Agriculture, on behalf of the organized farmers of Canada, met at Chicago in May in a friendly conference with representatives of the National Board of Farm Organizations of the United States. This meeting was held as a result of negotiations which had been in progress between these two organizations since the beginning of the year. The idea of the international meeting with the representatives of the organized farmers of the United States was unanimously approved at the last meeting of the Canadian Council of Agriculture held in Toronto in March.

The Chicago meeting was a preliminary contact between the executive bodies of the two organizations. The outcome of the conference was the following recommendation which was signed by representatives of the two bodies:

"We recommend the establishment of an International Committee representing the organized farmers of the United States and of Canada. The purpose of this committee would be to examine and discuss all questions arising between Canada and the United States, which would be calculated to affect friendly relations between the two countries. This committee might also properly look into all practical matters bearing upon the economic and social welfare of the farmers of North America, to the end that agriculture on this continent be placed upon a self-sustaining basis."

This report, if approved at the next meeting of the Canadian Council of Agriculture,

will be the commencement of an international organization between the farmers of the two countries and it is hoped will become a strong agency for the solution of many of the practical problems which the rural people of the two countries have in common. The five points taken up at the conference were as follows.

- (1) Possibility of establishing an International Board of Agriculture representing the organized farmers of the United States and of Canada. The purpose of this Board would be to examine and discuss all questions arising between Canada and the United States, which would be calculated to affect friendly relations between the two countries.
- (2) Question of cutting down expenditures now being made on military and naval equipment. This would involve the attitude of the organized farmer of the United States and Canada towards militarism.
- (3) Relationship between agriculture and labour.
- (4) The question of a fair return to the farmer for his work of food production. This introduces the variable quantity known as the costs of production, and what might constitute a fair basis for estimating a dividend for the farmer upon capital investment.
- (5) Economic relations between the farmers of the United States and of Canada.

A MESSAGE FROM INDIA

L. A. Kenoyer connected with the Allahabad Agricultural Institute, India, in an interesting letter to the editor of THE AGRICULTURAL GAZETTE OF CANADA, states that the staff of that Institute is busy fitting up in a large way to meet the great needs of that distant empire. Mr. Higginbottom, Principal of the Institute and who was a student at Ontario Agricultural College, has

been on this continent for the last six or seven months and Mr. Kenoyer has been in charge during his absence. The letter says they have just moved into a new dairy building and are getting the most modern machinery for pasteurizing, cream separating, and buttermaking. They have also a dipping vat to rid cattle of ticks, a new feed storehouse, two cattle sheds, and a group of

siloes, the whole, says Mr. Kenoyer, making an admirable ensemble for the teaching and demonstration of the dairy business. The Government has promised the equivalent of \$20,000, provided an equal amount is raised by efforts of the Institute for an assembly hall, laboratories, and class rooms. With this equipment it is anticipated that the Institute will be in a position to give students work equal to any agricultural training that is given in India. Mr. Kenoyer himself is compiling a weed annual. Agriculture is being offered as a highest study of the six years of science planned by a government committee appointed to draw up courses in elementary science to be introduced into the schools of the United Pro-

vinces. The committee hope to be equal to the responsibility of setting the pace for the instruction of the school boys of a population of fifty millions in agriculture, which is the direct means of livelihood for three-quarters of the population. Mr. Kenoyer says that his aim is to make the Allahabad Agricultural Institute a centre for the betterment of rural life in every possible way. At the closing of the session this year the most robust of the clever students who received graduation certificates was a young prince of India who owns a large estate which he is in training to manage. He willingly worked in the demonstration plots side by side with students from the most desolate of homes.

A RETURNED SOLDIER'S FARMING SUCCESS

FROM THE DIRECTOR OF INFORMATION, SOLDIER SETTLEMENT BOARD, OTTAWA

What a determined, enthusiastic, and adaptable man can do on the land is told by the New Westminster *British Columbian*. B. Bruckshaw, on his return from four years in the army, decided to settle on the land and chose 40 acres near Meridian, taking possession last September. The place was breast high with undergrowth and, generally speaking, was a pretty tough proposition. However, he took his wife and five children (the youngest two months old) to his location and pitched a bell tent. He was told by neighbours that he was making a mistake, as the land needed draining and would take too much capital to clear it.

He built a barn and moved the family in. At that time his two cows were left in the open. He started to clear his land with a mower after turning down the lowest tender of \$18 per acre for the job. With hard work he succeeded last autumn in clearing 15

acres, and his stand of oats compares favourably with anything in the valley.

Next he built a five-roomed house, 28' x 42', and in the spring he continued to clear land and to put in crops of oats, peas, and vetches. Mr. Bruckshaw also has several acres in potatoes, turnips, mangels, and carrots, a good garden, a chicken house with nearly 400 chickens, and five acres seeded to barley. Neighbours turned to and helped him erect a home, so that the labour did not cost him a cent.

The barn has accommodation for twelve cows, and at present houses six grade Jerseys and three heifer calves of his own raising.

He and a neighbour, also a returned soldier, piped water 1,700 ft. to their houses.

He has more land under cultivation now than some of his neighbours who have held land for more than 20 years, and who did not spend four years fighting the foe.

ASSOCIATIONS AND SOCIETIES

CANADIAN SOCIETY OF TECHNICAL AGRICULTURISTS

The first convention of members of the Canadian Society of Technical Agriculturists was held in Ottawa on June 2, 3, and 4, 1920. The main purpose of the convention was the complete and permanent organization of the Society. A banquet was held on the evening of the first day at which a speech was delivered by His Excellency the Governor General, which will be found on page 552 of this number of THE GAZETTE.

At the convention, L. S. Klinck, B.S.A., M.S.A., President and Professor of Agronomy of the University of British Columbia, presided. Leading officials of the Dominion and various provincial Departments of

Agriculture and others prominent in agriculture were present, including Hon. S. F. Tolmie, Dominion Minister of Agriculture, and Dr. J. H. Grisdale, Deputy Minister.

Papers were read, or addresses given, by Dr. J. W. Robertson, Ottawa, on "Technical Agriculturists in relation to Agricultural Problems"; by Dr. F. C. Harrison, Macdonald College, on "Study Courses at our Agricultural Colleges"; by Geo. A. Putnam, Department of Agriculture, Toronto, on "Agricultural Extension Work in Canada"; by Prof. H. Barton, Macdonald College, on "The Basic Principles

of the Society, what they must be and why necessary"; by Thomas Moore, President of the Trades and Labour Congress, on "The Basic Industry as seen through Urban Eyes"; by President L. S. Klinck, of the University of British Columbia, on "Federal and Provincial Agricultural Policies"; by Prof. J. W. Crow, O.A.C., Guelph, on "The Agricultural College in relation to the Farmers' Movement"; by Dr. W. P. Thompson, University of Saskatchewan, on "Scientific Research in relation to Agricultural Problems"; by Dr. A. B. Macallum, Chairman of the Research Council, on "The Aims of the Research Council in Relation to this question,"; by Dr. M. Cumming, Nova Scotia Agricultural College, on "Post Graduate Courses in Agriculture"; by Dean Howes, University of Alberta, on "Fields of Effort for Local Organizations"; by President Reynolds, Manitoba Agricultural College, on "A Vision for Canadian Agriculture."



L. S. KLINCK, D.SC., M.S.A., PRESIDENT OF
THE UNIVERSITY OF BRITISH COLUMBIA
AND OF THE CANADIAN SOCIETY OF
TECHNICAL AGRICULTURISTS

THE CONSTITUTION

Constitution and by-laws were adopted, resolutions passed, and officers elected. The constitution defines the object of the Society and the eligibility of members as follows:

Name and Objects

The organization shall be known as the Canadian Society of Technical Agriculturists.

The objects of the Society shall be the following:—

- (a) To organize and unite all workers in scientific and technical agriculture, so that they may combine effort to promote the scientific and practical efficiency of the profession and to make the profession of increasing service to the agricultural industry.
- (b) To maintain high standards in the profession.
- (c) To encourage a national policy of agricultural research.
- (d) To help to procure for scientific work in agriculture greater financial support and wider fields of usefulness.

(e) To aid in securing and maintaining a closer co-operation among all workers engaged in the profession of agriculture in Canada, and the better coordination of their work.

(f) To aid in bringing about a closer coordination between the profession as an organized body and the various agricultural associations throughout Canada.

(g) To serve as a medium where progressive ideas for improvements in agricultural education, investigation, publicity, and extension work can be discussed, formulated and recommended for adoption when deemed advisable.

(h) To aid in insuring the employment of technical men for technical positions.

(i) To issue publications in the interests of Agricultural science.

Eligibility to Membership

There shall be two classes of members, regular and honorary.

1. Eligibility requirements for regular members shall be as follows:—

(a) Every member must be a graduate in Agriculture from a University or College of recognized standing.

(b) A graduate of a University or College who is engaged in Agricultural Research, administration, education, extension work, publicity, experimental problems, or other forms of allied work of a scientific or managerial nature.

(c) Engaged in Agricultural Research, administration, education, extension work, publicity, or experimental problems, and be accepted as provided for in the by-laws.

2. The Honorary members' class shall be composed of persons not eligible for regular membership who have rendered the profession valuable or special service. They shall be selected as provided for in the by-laws.

3. From the regular members there shall be chosen a body of "Fellows" not exceeding thirty in number. The title "Fellow" shall be granted for professional distinction only, and be bestowed as provided for in the by-laws.

Officers

The officers of the Society shall be a president, first and second vice-president, and honorary secretary-treasurer, who, together with one member of each provincial executive, shall form the Dominion Executive of the Society.

Organization

The organization of the Society shall be:

(a) The Dominion Executive, consisting of the officers and members provided for in the Article immediately foregoing.

(b) The Provincial Executives.

(c) The Local Branch Executives.

The constitution also provides that one annual convention shall be held alternately in Eastern and Western Canada; that one-third of an executive shall form a quorum, and one-fifth of the members at any branch meeting shall do the same; that the place of meeting of the Society for the following year shall be decided upon at each annual convention; that a month before the annual convention the Dominion Executive shall appoint the special or standing committees required, and that the constitution may be amended by unanimous or majority vote.

THE BY-LAWS

The by-laws decided upon are as follows:

Membership

1. The Society is Canadian, but Canadians resident in other countries are eligible for regular membership. Citizens of foreign countries are eligible for Honorary Membership.

2. Applications for regular membership must be made in writing to the Secretary of the Local Branch for recommendation to the Membership Committee of the Dominion Executive.

3. Fellowships are granted upon recommendations made by the Dominion Executive or a sub-committee of that body after such recommendations have been passed upon and confirmed by a two-thirds vote of the delegates at any annual convention. Any regular member may make recommendations for a fellowship through the prescribed channels.

It shall be provided however that until all the vacant fellowships are filled, not more than 5 may be appointed at any one annual convention.

4. Honorary members may be elected upon nomination by the Dominion Executive at any annual convention after acceptance by a two-thirds vote of the delegates.

5. Members, who in the opinion of the Dominion Executive have failed to maintain the dignity of the profession may be recommended for suspension by that body, but such recommendation before being put into effect will require to be substantiated by a two-thirds vote of the delegates present at the next annual convention.

Organization

1. Hereafter no one shall be eligible for the Dominion Executive who has not been a member of the Society for one year.

2. The Dominion Executive shall be the business body of the Society and as such shall transact all general business of the organization. It shall be responsible for all standing committees, functioning in a manner satisfactory to the best interests of the Society.

3. Upon the application of 20 members, the Dominion Executive may permit the formation of a local branch, providing, however, that there shall be at least one local branch in each Province, irrespective of the number of members in that Province.

4. Where there are two or more locals in any one Province, these Locals shall form a Provincial Executive through, which all dealings with the Dominion Executive must be conducted. The first Provincial Executive shall consist of the President, Vice-President and Secretary-Treasurer of each Local and shall proceed to effect the organization of their own Province.

Meetings

1. The Fiscal Year of the Society shall commence on June 1 of each year, and the Annual Convention shall be held within the next three weeks from that date. It shall be convened in such city as may be decided upon at the preceding Annual Convention.

2. Each Local Branch shall be entitled to send one delegate for every 20 members and any majority fraction of 20 members.

3. Except where otherwise specified in the by-laws, all voting at conventions is reserved for official delegates.

4. The Dominion Executive may call such other conventions of the Society as may be necessary to carry on efficient work.

5. Local Branches shall hold meetings as arranged by their executives.

6. The Dominion Executive shall meet when and where they may decide providing that at least two such meetings are held annually.

7. Notification of the place and date of the Annual Convention shall be sent by mail to each Provincial Executive at least two months before it is to be held.

Notification of the place and date of Dominion Executive meetings shall be sent by mail to each member of the Executive at least one (1) month before it is to be held, together with agenda of business to be considered, apart from that of a routine nature.

Fees

The membership fee of the Society shall be \$10 per annum, payable on the 31st of May. This fee shall be forwarded to the General Secretary.

Funds

Funds for the purpose of the Society may be raised by assessment upon each regular member by the Finance Committee provided that a four-fifths affirmative vote of the registered delegates at any Annual Convention shall be obtained.

Elections

1. Nominations for President, 1st Vice-President, 2nd Vice-President, and Honorary Secretary-Treasurer shall be valid if received by the Secretary of the Dominion Executive on or before March 31, provided they are signed by 10 regular members in good standing.

2. The election of these officers shall be conducted on the Proportional Representation System, and shall be by mail ballot, every regular member in good standing shall be entitled to cast one ballot, which shall be sent out by the General Secretary not later than April 10 and these shall be counted by a Committee consisting of the General Secretary, one member of the Dominion Executive and a third party, not a member of the Society who shall be selected by the Dominion Executive.

3. All ballots shall be the regular form of ballot used by the Proportional Representation Society of Canada. These shall be supplied together with one "voting envelope" and one "identification envelope."

Committees

1. The Committees of this Society shall be:— On Membership, Finance, Progress, which shall be sub-committees of the Dominion Executive; Research, Publications, which shall be standing committees together with such others as may be deemed necessary; Conventions, which shall be appointed by the Dominion Executive; Resolutions; Nominations, which shall be nominated and elected by and for each convention, together with such other temporary committees as may be necessary for the efficient working of the Convention.

2. The personnel of the Standing Committees shall be reviewed by the Committee on Nominations at each Annual Convention, which committee shall make recommendations for re-appointments and re-organization of all Standing Committees. Other Committees shall be elected at each annual convention, or shall be appointed by the Dominion Executive.

3. It shall be customary, but not obligatory, that the Chairman of each Standing Committee shall be a member of the Dominion Executive. Each Committee shall consist of at least three members with power to add to their number.

Amendments to By-laws

The by-laws of this Society may be amended, or added to, by a majority vote of the delegates present at the annual convention, or by a four-fifths majority of the members of the Dominion Executive subject to approval at the next convention, provided that, in the first case, notification of the proposed amendment is sent to the General Secretary before May 1.

The General Secretary shall forward copies of all proposed amendments to the Secretary-Treasurer of each Provincial Executive.

THE RESOLUTIONS

The Resolutions adopted were as follows:

1. That since responsibility for results is laid upon the heads of Departments and of Colleges, all administrative and technical appointments be made on the recommendation of the heads of Departments and of Colleges concerned, and that salaries be fixed on the same recommendation within the schedules from time to time approved by Order in Council; and

That a committee of three of this Society be appointed to hold office for one year to devise means by which these ends may be attained; and

That this Committee report from time to time to the Dominion Executive, who shall be authorized to take such action in these matters as they may deem advisable to ensure the end desired; and

That a copy of this resolution be forwarded to the Minister of Agriculture for Canada and to the Ministers of Agriculture and of Education for the various Provinces.

2. That this Organizing Convention of the Canadian Society of Technical Agriculturists place on record our deep appreciation of the excellent work done by the provisional Organizing Committee in preparing for this Convention and in carrying through the splendid programme.

3. Whereas we have in Canadian agriculture a number of men who have rendered most distinguished service, and who are without academic degrees;

Therefore be it resolved that this Society appoint a Standing Committee to consider all such cases, and to bring the same to the attention of Canadian universities.

4. That this Convention approves the publication of a Journal of Scientific Agriculture by the Society, and further that the Standing Committee on Publications gives the question careful and immediate consideration, with the view of publishing, if possible, at least one issue of such a journal before the next annual Convention.

5. That the Honorary Secretary-Treasurer be instructed to endeavour to have as many bodies or organizations who are working in the interests of agriculture, meet at the same time and place as this Society, and further, where possible, take steps to have such other societies affiliate with this Society.

6. Whereas, Canada's development and prosperity depend very largely upon the upbuilding of national trade;

And whereas, it is trade development that will make agriculture profitable;

Therefore, be it Resolved that the agricultural curricula be amended to include comprehensive courses in markets requirements, marketing methods, business practice and the economics of production, and that a committee be appointed to consider this matter.

7. Whereas, the agricultural college by virtue of its function as an educational institution is recognized as occupying a position of primary importance in our agricultural development;

And, whereas, the proper organization of research, experimentation and plant breeding is of vital importance to the agricultural college;

And, whereas, the present situation as between the Federal and Provincial Departments is such as to constitute a real handicap to the agricultural college;

Therefore, be it Resolved that this Society appoint a Standing Committee to draft a comprehensive policy covering these matters.

OFFICERS AND COMMITTEES

The following officers were elected and Committees appointed:

President, L. S. Klinck, D.Sc., M.S.A., President of the University of British Columbia, Vancouver, B.C.

First Vice President, H. Barton, B.S.A., Professor of Animal Husbandry, Macdonald College, Ste. Anne de Bellevue, Que.

Second Vice President, J. N. Ponton, B.S.A., Montreal, Que.

Honorary Secretary-Treasurer, L. H. Newman, B.S.A., Secretary, Canadian Seed Growers' Association, Ottawa.

General Secretary-Treasurer, F. H. Grindley, B.S.A., University Club, Ottawa.

The constitution provides, as will be seen by the extract given, that one member of each provincial executive, with the foregoing officers, shall form the Dominion executive, but, awaiting provincial organization, the following were chosen temporarily to act: Alberta, G. H. Cutler; British Columbia, A. F. Barss; Manitoba, Prof. T. J. Harrison; New Brunswick, E. P. Bradt;

Nova Scotia, G. E. Sanders; Prince Edward Island, J. A. Clark; Ontario, G. J. Spencer; Quebec, Jules Simard; Saskatchewan, Dr. W. P. Thompson.

The Committees appointed were as follows:

MEMBERSHIP: L. H. Newman (Chairman), H. Barton and Jules Simard.

FINANCE: H. Barton (Chairman), L. H. Newman and J. N. Ponton.

PROGRESS: T. J. Harrison (Chairman), G. H. Cutler and G. E. Sanders.

RESEARCH: Dr. J. M. Swaine (Chairman), Dr. W. P. Thompson, Dr. A. T. Charron, Dr. J. F. Snell, J. W. Crow.

PUBLICATIONS: F. E. Buck (Chairman), J. N. Ponton, J. B. Munro, Arthur Kelsall, W. H. Porter.

MARKETING EDUCATION: H. S. Arkell (Chairman), H. Barton, Wade Toole, G. H. Clark, F. M. Clement.

AGRICULTURAL POLICIES: J. B. Reynolds (Chairman), Dr. J. H. Grisdale, E. A. Howes, G. H. Clark, P. A. Boving.

TECHNICAL APPOINTMENTS: J. B. Reynolds (Chairman), Dr. M. Cumming, E. S. Archibald.

POST GRADUATE WORK: Dr. F. C. Harrison (Chairman), J. B. Reynolds, Dr. W. P. Thompson, H. S. Arkell, E. A. Howes, Dr. J. M. Swaine.

STRENGTH OF THE SOCIETY

The membership of the Society on June 15, 1920, was four hundred and thirty-five, distributed as follows: Alberta, 24; British Columbia, 43; Manitoba, 27; New Brunswick, 20; Nova Scotia, 18; Ontario, 166; Prince Edward Island, 10; Quebec, 100; Saskatchewan 22, and the United States, 5.

Among these members are included representatives of practically all agricultural activities in Canada. The Federal Minister of Agriculture and the Deputy Minister are members; The Agricultural Colleges are represented by the following:—Dr. M. Cumming, Nova Scotia Agricultural College; Dr. F. C. Harrison, Macdonald College; President J. B. Reynolds, Ontario Agricultural College; President Bracken, Manitoba Agricultural College; Dean Howes, Alberta College of Agriculture; Dean Rutherford, Saskatchewan Agricultural College; President Klinck, University of British Columbia, and Dean Clement, British Columbia College of Agriculture. Practically all members of the staffs at these colleges have also joined the Society. Dr. Jas. W. Robertson, who represented the Canadian Department of Agriculture at the Peace Conference, was one of the first members and has given the Society his strongest support from the beginning. Agricultural Representatives in various provinces, graduates engaged in journalism, graduate farmers, superintendents of experimental farms, and men engaged in many other lines of agricultural work in Canada, are included in the list of members.

At the close of the convention it was decided that the next annual gathering should be held in Winnipeg, Man., about the middle of June, 1921.

ANIMAL DISEASES ERADICATION BOARD

The Animal Diseases Eradication Board, which has for its object the formulation and carrying out of plans for controlling diseases of live stock in Canada, has been organized in Toronto. It is planned that particular attention will be given to tuberculosis of live stock.

The Board is composed of twelve members, four from the live stock associations, four from the meat packers and four from the federal department of agriculture. The headquarters of the Board will be at Ottawa.

An executive committee of three members, one from each of the interests represented, was appointed at the Toronto meeting to consider and make recommendations to the full Board with reference to the details of a plan for most effectively controlling this disease. The broad outlines of the plan have already been agreed upon by the Board. The objects in view will involve hearty co-operation between the packers, the live stock men, the federal and provincial departments of agriculture and the solid backing of all interested in the disease.

CANADIAN AYRSHIRE BREEDERS' ASSOCIATION

The Canadian Ayrshire Breeders' Association are commemorating the Jubilee Year of their organization in Canada by the commencement of the publication of a monthly magazine "The Canadian Ayrshire Review". In the first number, which was that for May, Mr. W. F. Stephen, Secretary of the association and editor, expresses the opinion that "The Review" will be the "red line" that

will bring Ayrshire breeders into closer touch with each other causing greater unanimity and a greater spirit of co-operation. This number contains a message from the Honourable S. F. Tolmie, the Live Stock Commissioner, H. S. Arkell, E. S. Archibald, Director of Experimental Farms, and H. Barton, Professor of Animal Husbandry at Macdonald College.

JUNIOR AYRSHIRE CLUBS

The Canadian Ayrshire Breeders' Association are organizing Junior Ayrshire Clubs and will devote a page of the *Canadian Ayrshire Review* each month to their activities. Boys and girls under fourteen years of age, whose parents or guardians keep registered Ayrshires, are eligible for membership by complying with the following conditions:

1. Each member must own a registered Ayrshire calf, feed and care for it for six months;
2. Write two brief letters during the period concerning themselves and their calves;
3. Before November 30 send to the editor of *The Review* a picture of the calf and an account of how it was fed and raised.

Prizes are awarded according to the merit of the work accomplished.

NOTES

Queen's University of Kingston, Ont., has bestowed the honorary degree of Doctor of Laws on Mr. Seager Wheeler, "the wheat wizard," of Rosthern, Sask.

A new monthly magazine, "Agricultural Alberta," devoted to agriculture and its allied interests is being published at Edmonton, Alta.

Experiments carried on at the Experimental Farm, Agassiz, B.C., for several seasons have demonstrated that self-feeders for swine are an improvement over the trough feeding method where more than ten pigs are kept. The big advantage is the reduction of the labour expense.

In a city of Ohio 2,000 business and professional men, at the beginning of the season, announced that they would give one day's services each week to farmers. The members of the Colgate University football team decided to do their summer training in the corn fields and potato patches in central New York.

On the whole the position in England as regards live stock in 1919 can be summed up by saying that the stock of horses on farms was fairly good, while the number of cows and other cattle was above the pre-war level. The stocks of sheep and pigs, on the other hand, were both abnormally low, and the

decline is regarded as mainly attributable to the measures which had to be taken to control and ration the meat supply.

At a sale of Canadian bred Aberdeen Angus cattle held in Toronto on June 6 under the auspices of the Canadian Aberdeen Angus Association fifty-seven head were sold. The highest price paid was \$900 for imported Idealist of Maisenore, a two-year-old bull sent in by H. Fraleigh of Forest, Ont. The females ranged in price around three hundred to four hundred and fifty dollars and were largely retained in Ontario.

At a special meeting of the directors of the British Columbia Dairymen's Association held at Armstrong, B.C., on June 2, it was decided to hold the winter convention of the association in Victoria some time in January, 1921, when an elaborate display is to be made of dairy products similar to a like exhibition held in Vancouver the first month of this year. A resolution was passed protesting against any extension of time for the sale of oleomargarine.

Over 200 members of the Manitoba Horticultural and Forestry Association and the Natural History Association of that province, paid a visit to the Agricultural College on June 17. Attention was especially paid to the cultivation of hardy fruits in Manitoba, in connection with which the college has cultivated a good variety of plum, that weathers the winter without any trace of killing. Several varieties of apples have also been successfully grown.

At a joint meeting of a special committee of the Guelph City Council, the Fat Stock Club, and the Trades and Labour Council, J. E. Rettie, secretary of the Ontario Provincial Winter Fair in succession to R. W. Wade, who recently resigned, stated that the 1920 winter fair would be carried on under the terms of the old agreement, and that the Honourable Manning Doherty, provincial Minister of Agriculture, was considering the making of a new agreement for a term of years.

Considerable improvements and additions are contemplated at the Ontario Agricultural College. Hon. Manning Doherty, provincial Minister of Agriculture, stated at the Fertilizers' convention held at the college on June 17 that plans had been approved for the new building of the Ontario Veterinary College. A site was also selected for new stabling accommodation, separate and distinct from the present farm buildings, being designed for the special treatment of animals afflicted with diseases that are more or less common.

The province of Alberta has become responsible for about three and three-quarters millions of dollars for seed grain advanced by municipalities to farmers in the present and past seasons. It has also directly advanced seed to farmers in unorganized districts to the extent of another three-quarters of a million of dollars. In the matter of helping the farmers to get good seed grain the Government and the Legislature have given every assistance possible.

The eleventh annual sale of bulls was held at Lacombe, Alberta, on May 27. There were 315 entries, and, in spite of scarcity of feeds, the condition of the animals was good. Prices, however, were rather below those of last year. There were 158 Shorthorns, 68 Angus, and 89 Herefords offered. The Shorthorn average was \$231 for 138 animals, the Angus average was \$201.50 for 60 animals, and the Hereford average was \$175.86 for 81 animals. Last year the Shorthorn average was \$239.18 for 55 animals, the Hereford \$218.64 for 59 animals, and the Angus \$233.75 for 12 animals. Everything taken into account, the sale was considered quite satisfactory.

A test on a large scale was recently made of farm tractors at Lincoln, England. Practically every tractor on the British market was represented. Each one showed its capacity for ploughing and cultivating and many in addition worked threshing machines and hauled on the road. Six practical farmers of prominence, members of the Council of the National Farmers' Union, acted as judges in conjunction with a consulting engineer who specializes in tractor designs. The machines entered for the trial included four-wheel tractors, three-wheel tractors, self-contained motor ploughs and creeper track tractors. The trials were declared very satisfactory, especially as regards British-made tractors.

Arrangements were again made this year by fruit growers of British Columbia for registration of women and girl fruit pickers. This is the fourth year that most of the fruit of the province has been harvested by girls. Registration was made under the women's branch of the Government Employment Bureau. An increase in the schedule of wages was made, there being a guarantee of two dollars per day on an eight-hour basis. In order that the good worker might not be restricted to this daily payment, a piece work plan was arranged by which the girls were able to earn up to three dollars a day. A payment committee was appointed whose duty it was to set a higher rate of pay for the poor patch so that the picker did not suffer in comparison with the picker on a more highly favoured patch. Conveyances were engaged to carry the girls back and forth and tents and cots provided for the accommodation of the pickers on the fields.

NEW PUBLICATIONS

NOVA SCOTIA

Fruit Growers' Association of Nova Scotia, Annual Report, 1920. This report contains the officers for 1920 and presents the addresses delivered at the fifty-sixth annual meeting held in Kemptville, N.S., in January, 1920.

QUEBEC

Why and How to Produce Strawberries for Market, Bulletin No. 66, by J. H. Lavoie. This bulletin gives complete instructions in French on the best methods of growing strawberries for market.

ONTARIO

Fruit Growers' Association of Ontario, Fifty-first Annual Report for the year ending 1919. This bulletin gives in full the addresses of speakers at the annual convention held in Toronto, November, 1919. It also includes the report of the Resolutions Committee and the treasurer's report to the officers for 1920.

Women's Institute Circular No. 28 contains a list of meetings and speakers for the women's institute meetings of the summer series of 1920. Besides the schedules and speakers it gives a list of topics to be discussed.

Annual Report of the Department of Agriculture, 1918. The annual report this year is published in two large bound volumes. Volume I contains reports of the Minister, agricultural college, experimental union, dairymen's associations, live stock branch, stallion enrolment board, corn growers' association and horticultural societies. Volume II contains reports of statistics branch, bee-keepers, fruit growers and vegetable growers' associations, agricultural and entomological societies, women's institutes, and the Vineland Horticultural Experiment Station.

Vegetable Growers' Association, Fifteenth Annual Report, 1919. This report in addition to outlining the work of the association for the year 1919, which is well summed up in the reports of the secretary-treasurer and the field specialist, contains the addresses given at the annual convention in Toronto in January, 1920.

MANITOBA

Grasshoppers or Locusts, by A. V. Mitchener, B.A., B.S.A. This subject is dealt with in a series of five lessons prepared by Mr. Mitchener for use in the public schools of the province. The lessons are so arranged that a very complete knowledge of the locust and its control may be gained.

Lessons in Millinery, Extension Bulletin No. 45 is an instruction conducted on the making of ladies' hats. It is prepared by Miss Agnes Campbell of the Agricultural Extension Service and contains information useful to either rural or city ladies.

Bee-keeping in Manitoba, Extension Bulletin No. 47, by R. M. Muckle, B.S.A. This bulletin covers the subject of bee-keeping in an interesting, practical and scientific manner. The subject is thoroughly discussed in all its details.

Common Breeds of Poultry, Extension Bulletin No. 48. This bulletin by M. C. Herner, B.S.A., and A. K. Stratton, B.S.A., supersedes Extension Bulletin No. 9. It discusses the evolution of poultry breeds, characteristics of good and poor layers, indications of breed and variety, etc. It is full of valuable information for the practical poultryman.

SASKATCHEWAN

Report of Conference of Managers of Agricultural Co-operative Associations. This pamphlet contains a detailed report of the proceedings at the Regina Conference held in March, 1920.

BRITISH COLUMBIA

British Columbia Fruit Growers' Associations, Thirtieth Annual Report, for the year ending December 31, 1919. This publication contains a complete report of the activities of the association for the year 1919, and includes the proceedings of the annual convention held at Vernon in January, 1920.

MISCELLANEOUS

School Book of Farming. This book is an addition to the Rural Education Book series and its purpose is to develop a point of view on farming and country life in the minds of the young, to explain the relationship of the parts and to state the main reasons underlying the growing of the leading crops and the raising of the common animals. The book is exceedingly interesting and will be a valuable addition to any agricultural library. It is published by the Macmillan Company of Toronto, Ontario.

Vegetable Growers' Association, 15th Annual Report. This is a chronicle of the proceedings at the 15th annual convention of the Ontario Vegetable Association. A number of interesting papers are given.

Veterinary Science and Its Opportunities. Under this title the Directorate of the Ontario Veterinary College have issued, simultaneously with the calendar of the college, a

sixteen-page brochure giving some particulars of the college itself and of the advantages offered by the veterinary profession.

Report of the Dominion Grain Research Laboratory, Winnipeg, Man. In this bulletin there are outlined the findings regarding moisture in grain and its effect, also milling and baking experiments with various grades and varieties of wheat. It also contains information on the grading of flax and special work.

Report of the Minister of Agriculture for the year ending December 31, 1919. This report deals comprehensively with the various branches of agriculture carried on in the Dominion of Newfoundland.

Some Occurrence and Conditions Overseas which Affected the Production and Marketing of Canadian Products. This pamphlet contains a summary of an address delivered by

Dr. J. W. Robertson before the Standing Committee on Agriculture and Colonization of the House of Commons of Canada.

Canadian Ayrshire Review. A new magazine for the advancement of the Ayrshire breed was published in May, 1920. It will appear monthly. This magazine is the official organ of the Canadian Ayrshire Breeders' Association and it is edited by W. F. Stephen, secretary of the organization. It is printed in both English and French, the English edition appearing on the 5th and the French on the 15th of each month. This publication will be the means of circulating news of interest to Ayrshire men among the members of the association. *The Review* has been started not with a view to supplanting any of the agricultural and live stock journals, but to stimulate the Ayrshire business.

INDEX TO PERIODICAL LITERATURE

The Canadian Countryman, Toronto, Ont.—

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Some Fundamentals in Successful Corn Growing. P. L. Fancher, Corn Specialist, Chatham, Ont., page 3.

How to Grow More No. 1 Apples. E. F. Palmer, Superintendent, Vineland Experiment Station, page 6.

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Beef Cattle and Pasture vs. Labour Shortage. J. C. McBeath, B.S.A., Lecturer, Ontario Agricultural College, page 3.

Pointers on Tobacco Growing in Ontario. G. C. Routt, Acting Chief, Tobacco Division, Ottawa, page 4.

The Carburetor—The Heart of the Engine. L. G. Heimpel, B.S.A., Lecturer, Ontario Agricultural College, page 6.

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Science and Practice in Dairying. H. H. Dean, Professor of Dairy Husbandry, Ontario Agricultural College, page 6.

Pioneer Women of To-day. Mrs. B. O. Allen, Lecturer, Women's Institutes, Guelph, page 11.

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Garden Insect Pests. W. A. Ross, Vineland Experiment Station, page 5.

Le Bulletin de la Ferme, Quebec, P.Q.—

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Organization leads to Success. A. Desilets, Directeur des cercles de Germières, Quebec, P.Q., page 7.

The Canadian Entomologist, Toronto, Ont.—
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Charles Gordon Hewitt. Arthur Gibson, Acting Entomologist and J. W. Swaine, Assistant Entomologist for Forest Insects, page 97.

Popular and Practical Entomology. L. Caesar, Professor of Entomology and G. Garlick, Guelph, Ont., page 106.

Canadian Farm, Toronto, Ont.—

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Fertilizing Flue-Cured or Bright Tobacco. H. A. Freeman, Tobacco Inspector, Central Experimental Farm, page 14.

The Canadian Horticulturist, Peterboro, Ont.—
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Spraying Currants and Gooseberries. Professor L. Caesar, Ontario Agricultural College, Guelph, page 159.

The Canadian Power Farmer, Winnipeg, Man.—

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Disposing of the Country Home Sewage. S. J. Smith, Manitoba Agricultural College, Winnipeg, page 44.

Farmer's Advocate, and Home Magazine, London, Ont.—

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What Constitutes a Good Lightning Rod. Professor W. C. Blackwood, Ontario Agricultural College, Guelph, page 965.

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Losses of Young Steers Going to Grass. Wade Toole, B.S.A., Professor of Animal Husbandry, Ontario Agricultural College, page 1052.

Private Herd Record, G. E. Day, Secretary, Dominion Shorthorn Association, page 1053.

Farmer's Advocate and Home Journal, Winnipeg.—

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Varieties of Corn for Manitoba. W. C. McKillican, Superintendent, Brandon Experimental Farm, page 852.

Care of Small Plots of Cereals. P. Russel Cowan, Assistant Cerealists, Experimental Farm, Ottawa, page 858.

May 19,

Some Principles of Co-operative Marketing. C. H. Hallman, University of Saskatchewan, page 879.

June 2,

Practical Potato Culture in Alberta. G. E. Delong, B.S.A., University of Alberta, page 972.

Farmers' Magazine, Toronto.—

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The Exodus from the Channel Islands. J. C. McBeath, B.S.A., Lecturer in Animal Husbandry, Ontario Agricultural College, Guelph, page 7.

Experiences in Breeding Jerseys. Russell Fleming, Ontario Department of Agriculture, Toronto, page 9.

The Control of Swarming. F. W. L. Sladen, Dominion Apiarist, Central Experimental Farm, Ottawa, page 37.

The Crop and its Water Supply. L.G. Heimpel, B.S.A., Farm Foreman, Ontario Agricultural College, Guelph, page 38.

The Grain Growers' Guide, Winnipeg, Man.—

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Alberta Legislation, 1920. John D. Hunt, Clerk of the Executive Council, page 7.

Seed from Snowed-Under Flax. John Bracken, Professor of Field Husbandry, University of Saskatchewan, page 16.

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A Double-Planned Barn. L. J. Smith, B.S., Professor of Mechanics and Engineering, Manitoba Agricultural College, Winnipeg, page 16.

The Journal of Agriculture and Horticulture, Quebec.—

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The Laws of Heredity in Animal Breeding. W. Lochhead, Professor of Biology, Macdonald College, page 266.

The Preserving of Eggs in the Home. W. A. Brown, Chief of Poultry Division, Live Stock Branch, page 274.

When Should Timothy and Clover be Cut. R. Summerby, Professor of Cereal Husbandry, Macdonald College, page 258.

Cow Testing Work. A. H. White, Senior Supervisor, Cow Testing, page 263.

The Maritime Farmer and Co-operative Dairyman, Sussex, N.B.—

May 25,

Growing Potatoes for Larger Yields. W. T. Macoun, Dominion Horticulturist, Ottawa, page 627.

Objects and Work of the Demonstration Orchards in New Brunswick. G. A. Turney, Provincial Horticulturist, Guelph, page 629.

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Methods of Growing Tomatoes. J. A. Clark, Superintendent, Dominion Experimental Farm, Charlottetown, page 670.

Producing Winter Layers. W. W. Baird, Superintendent, Experimental Farm, Nappan, N.S., page 685.

The Nor'-West Farmer, Winnipeg, Man.—

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The Ploughing Match that Gets Results. J. McGregor Smith, Professor of Agricultural Engineering, University of Saskatchewan, page 812.

The mind of the farmer, like his soil, must have cultivation if there is to be an ample harvest. Those who neglect culture and refinement cannot enjoy wealth and leisure if these are acquired. Life is not worth living without an appreciation of the true and beautiful in life.

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

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CROPS AND CULTIVATION

687.—**Determination of the Value of Agricultural Lime.**—CONNER, S.D., in *The Journal of Industrial and Engineering Chemistry*, Vol. X, No. 12, pp. 996-999. Easton, Pa., December 1, 1918.

To determine the value of agricultural lime and calcareous fertilizers in general three methods were adopted:—(1) determination of the percentage of calcium and magnesium; (2) determination of the carbon dioxide; (3) determination of the neutralizing power to acids.

Pot experiments with wheat and clover grown in very acid soils showed the value of agricultural lime to be proportionate to its power of neutralizing acidity rather than to its content in lime, magnesia or carbon dioxide. The neutralizing power may be determined by boiling 1 gm. of the sample analyzed with a 6 cc. N/4 hydrochloric acid and 75 cc. of water for 15 minutes, and titrating the excess of acid with an N/2 solution of caustic soda, using phenolphthalein as an indicator.

The results, expressed in percentages of calcium carbonate, show certain magnesites and dolomites to contain an equivalent of calcium carbonate exceeding 100%.

With regard to their effect on the growth of crops the different calcareous or magnesia materials may be classed in the following order:—calcite, dolomite, magnesite, wollastonite, rock phosphate, serpentine, enstatite, gypsum. The order in which the materials diminish the acidity of the soil is as follows:—magnesite, dolomite, calcite, wollastonite, serpentine, rock phosphate, gypsum, enstatite.

The Lime Factor in Permanent Soil Improvement.—LIPMAN, J. G., and BLAIR, A.W., in *Soil Science*, Vol. 9, No. 2, pp. 83-114. Baltimore, Md., February, 1920.

Four 5-year rotations were carried out on a loam soil. In each rotation there were seven plots; one unlimed and one each that received 1,000, 2,000 and 4,000 pounds per acre of calcium limestone, and one each that

received like amounts of magnesium limestone. In each rotation legume crops were introduced either as one of the main crops or as a green-manure crop between the main crops. Two 5-year periods for each rotation have been completed.

Acid phosphate and muriate of potash were used in liberal amounts. Light applications of commercial nitrogenous fertilizers were made. No farm manure was used.

During the 10 years the limed plots, with only slight exception, have yielded distinctly larger crops and more total nitrogen than the unlimed plots. In most cases, the yields were larger with the 2,000 and 4,000-pound applications than with the 1,000-pound application. The two forms of limestone gave results which are quite similar. There appears to be a slight difference in favour of the magnesium limestone. In the majority of cases, the percentage of nitrogen was higher in crops from the limed than from the unlimed plots. The use of lime thus resulted in a gain in both quantity of the crop produced and also in the quality.

Analyses of the soil show, in a number of cases, a higher nitrogen content for limed than for unlimed plots; in other cases, the two are about on a level as to nitrogen content and in a few cases, there has apparently been a depletion of the nitrogen in the limed plots.

This work, taken in connection with the work presented in the preceding paper, would seem to indicate that in using lime emphasis should be laid on its power to make conditions favourable for the organisms associated with leguminous crops rather than on its power simply to neutralize soil acids. In other words, its value is more indirect than direct.

688.—**Effect of Farm Manure in Stimulating the Yields of Irrigated Field Crops.**—SCOFIELD, C. S., in the *Journal of Agricultural Research*, Vol. XV, No. 9, pp. 493-503. Washington, December 2, 1918.

The experiments described were carried out in three stations with irrigated soil under semi-arid climatic conditions, in order

to study the effect of farmyard manure on the production and quality of sugar beets and potatoes. The experiments lasted six years, from 1912 to 1917, in rotations of two to six years with roots and alfalfa. The manure was applied at the rate of 12 tons an acre for each rotation.

The application of manure to potatoes increased the crop by about 40 bushels an acre, and at the same time raised the proportion of marketable potatoes by 8%. The yield of sugar beets was also raised by 4.3 tons without any appreciable increase in the percentage of sugar. In five out of seven rotations the manure was applied to the experimental crop, and in two others to the preceding crop. In both cases the beneficial action of the manure is appreciable for two years or more after its application, both for the crops studied and for the other rotation crops.

Fertilizer Experiments with Cereals and Root Crops.—IVERSEN, K., in *Tidsskrift for Landbrugets Planteavl*, Vol. 26, No. 2, pp. 193-297. Copenhagen, 1919.

Experiments extending from 1901 to 1915, inclusive, with barley, oats, mangolds, and sugar beets on loam soil to determine the fertilizer requirements of the soil are reported in detail.

The best results were obtained with complete fertilization. It was found, however, that nitrogen was the most utilized and potash was next, while only comparatively a small part of the phosphate fertilizer applied was utilized by the different crops. Climatic conditions which generally increase the size of crops also favoured the utilization of fertilizers in soils growing oats and barley which had not been treated with stable manure. The greatest excess crop of barley grain was obtained in cold, dry summers, and of oats in cold, wet summers. In each instance the excess crop of straw was greatest in cold, wet summers.

In using artificial fertilizers on mangold and sugar beets in fields where stable manure was also used, the climatic conditions favourable to the size of the crop were usually unfavourable to the utilization of the artificial fertilizer. Hot summers, which favour the growth of heat loving roots, had an increasing effect on the decomposition of the manure, and there was less need for the nourishment contained in artificial fertilizers. The use of artificial fertilizers for mangolds and sugar beets gave on the whole a greater absolute surplus crop in cold, wet than in warm, dry summers. The percentage of surplus crop was found to be greater in both groups of experiments in years with unfavourable rather than with favourable conditions for growth.

In regard to the effects of the separate fertilizers, it was found that potassium

fertilizers gave the best average results in warm, dry summers, and phosphates in cold, wet summers. This difference in the case of phosphates was much more apparent in experiments with root crops in which stable manure had been used than in experiments with cereals. This relation indicates that the favourable effect of phosphates in cold, wet summers is not due to the direct effects of phosphoric acid as plant food, but is probably because easily dissolved compounds of phosphoric acid favour decomposition in the soil.

The results of these experiments, considered with reference to the relation between the productive capacity of the soil and the size of the excess crop using fertilizers, confirmed the Mitscherlich law of minimum.

Twenty Years of Fertilizers in an Apple Orchard.—HEDRICK, U. P., and ANTHONY, R. D., in *New York State Agricultural Experiment Station Bulletin* 460, pp. 71-96. Geneva, N.Y., 1919.

Bulletin 339 of the Station gave the results for the first seven harvests in a fertilizer experiment which was begun in the Station grounds in 1896. The present bulletin discusses the results secured in eight additional harvests. The factors considered in interpreting results are yield and size of fruit and tree growth. Detailed tabular records are given for each tree included in the experiment. The results secured on each plot are summarized and discussed.

As measured by yields, acid phosphate at the rate of 340 pounds per acre per year has been of no benefit when used alone. The addition of 196 pounds of muriate of potash to the 340 pounds of phosphoric acid apparently increased the yields, but the annual addition of 50 pounds of readily available nitrogen to these amounts of phosphoric acid and potash has caused no increase in yield. Plats receiving stable manure have yielded no more than the check plats. There has been a tendency for the checks and phosphoric acid plats to take a slightly lower rank in yield as the experiment has continued. In general, the results are so contradictory that no conclusion of practical value can be drawn from the yields.

As measured by size of fruit, there is a greater difference between two nearby checks than between any fertilized plat and its nearest check. This, considered in connection with the variations among the duplicates of the fertilizer treatments, makes it impossible to draw any definite conclusion as to the effect of the treatments on size of fruit.

As measured by tree growth, the two phosphorous and potassium plats lead their adjoining plats, both in size of trunk and in

tree volume, but it was impossible to conclude whether the increases were due to the potassium or the combination of the two elements, or to some tree or field variation which does not now show. Heavy applications of nitrogen in a complete fertilizer and in manure have not increased tree growth.

As measured by the costs of treatment, certain plats have given increases sufficient to equal the costs, or even to show a profit. Similar treatments in other plats have resulted in a loss.

Summing up the results of the experiment as a whole, the authors conclude that if the results continue in the present direction for another ten years, the increased yields may justify the recommendation of one or two of the treatments given; but at present this can not be done. Attention is called to the fact that these results are from a cultivated orchard on soil naturally well supplied with the plant feed elements. On thin, unfertilized, or in sod orchards the results might be quite different.

694.—Experiments on the Value of Green Sand as a Source of Potassium for Plant Culture.—TRUE, R. H., and GEISE, F.W., in the *Journal of Agricultural Research*, Vol. XV, No. 9, pp. 483-492. Washington, D.C., December 2, 1918.

The authors consider the green sands or green sand marls of the United States to be composed principally of glauconite (amorphous hydrated silicate of iron and potassium) with or without fossil detritus. Their composition is:—Calcium oxide 0.33 to 12.50%; phosphorus pentoxide 0.16 to 1.25%; sulphur trioxide 0 to 0.50%; total potassium oxide 1.52 to 7.63%; potassium soluble in dilute hydrochloric acid 1.35 to 6.80 %.

The authors tested the fertilizing values of these substances as compared with those of various potassium salts in sand and water cultures of wheat and clover grown in pots. The experiments lasted two months.

From the results obtained it appears that green sands and green sand marls are capable of supplying adequately the potassium requirement of the two crops tested during the first two months of their vegetative life. The aerial parts of the plants gave a higher yield in dry matter than that obtained with similar crops which had received potassium salts.

Exceptional results were obtained with a green sand of a so-called "poisonous" marl. Even in this case, however, the application of 1 to 5 tons per acre suffices only if 1 ton or more of ground lime be added to the fertilizer.

697.—Comparative Trials of Various Nitrogenous Manures in Germany.—MITSCHERLICH, E. A., SANCKEN, S.N. and IFFLAND, F., in the *Journal für Landwirtschaft*, Vol. LVI, Pt. 3, pp. 187-198. Berlin, 1918.

Experiments with various nitrogenous manures (nitrate of soda, sulphate of ammonia, urea, nitrate of urea), on crops of oats on a sandy soil, compared with control plots without nitrogenous manures. The results have shown that urea and nitrate of urea are at least equal to other ordinary nitrogenous manures, nitrate of urea constituting an excellent top-dressing, and capable, in this respect, of replacing effectively nitrate of soda.

The authors then develop some theoretical considerations to show the error of the common idea that a given quantity of a manure should bring about a determined increase in yield; the contrary takes place, in virtue of the law of physiological ratios which has the effect, for example, that the first 10 kg. of nitrogen applied per hectare have a more efficacious action than the second 10, the latter a superior action to that of the third, and so on.

711.—Selection Work With Winter Wheat at the Station of Ultuna, Sweden.—TORSSELL, R., in *Sveriges Utsädesförenings Tidskrift*, Year XXIX, Pt. 1, pp. 10-13. Malmö, 1919.

The auxiliary Station of Ultuna (to the south of Upsala) serves the region of Mälaren, the lower zone of the territory of Delarne and the southern districts of Gästrikland.

Among the plants submitted to selection and hybridization, winter wheat holds one of the first places and its cultivation could be extended with advantage over vast expanses of good wheat land.

The climatic conditions, on the contrary, are very unfavourable; the shortness of the growing season constitutes a serious obstacle to the work of the selector, who must limit the choice of material for study to the most early types.

For a long period numerous comparative cultural experiments have been made with some of the best wheats obtained at Svalof, such as Renodlad Squarehead, Bor, Ris, Igris and Pudel, which have given good results; but finally these have been totally replaced by the new types of the Thule series, created specially for Mid Sweden.

From the beginning of the work it was seen that, to arrive at positive results, it was necessary to have recourse to the old pubescent native wheat, which has a high degree of resistance to cold and at the same time is very early. In the work of selection the following two methods have been pursued:—(1) genealogical selection (by pure

lines) of native wheat; (2) crossing of this wheat with exotic wheats remarkable for their high productivity.

Work of Crossing.—In 1905, at Svalof, a beginning was made by crossing native wheat and Pudel (this last relatively resistant to cold and a good producer); from these crossings the series of Thule wheats is derived.

In 1914, after four years of cultural experiments at Ultuna, Thule was put on the market and, in 1917, another type appeared, produced by subsequent selection from the same material, that is to say Thule II.

Thule I and Thule II were both created at Svalof, but meanwhile some of the experimental seed taken to Ultuna to be submitted to selection gave rise to new and valuable types, notably Svea wheat, still more resistant than Thule II to the severity of winter. All these newly created varieties, although very good from the point of view of yield, of strength of straw and of resistance to rust, are not yet so early and resistant as the native varieties.

In order to obtain types which, while retaining the productivity of Thule II, possess to a higher degree the resistant character of native wheat, rehybridization of Thule with this native wheat has been carried further.

The products of this crossing are at present under examination, and so far they are considered very promising.

Genealogical Selection.—In resistance to blight, strength of straw, and productivity, the native types, while leaving on the whole much to be desired, present great, individual differences both fixed and transmissible, which give opportunity for improvement by direct selection.

The native wheats of Svalof selected from pure strains (the "Svalof renodlads Sammetsvete") are worthy of note, although the best types have not yet been put on the market.

At Ultuna numerous strains and families of native wheats derived from various provinces of Sweden, as far as Norrland, are on trial. For example, wheats from Filholm, Tornerud, Latorp, native wheat from Varmland and Vasternorrland. These last two have given the best results. They are distinguished, in fact, from common native wheat not only by their greater productivity, but also by a higher degree of resistance to rust (especially Vasternorrland) and by the strength of the straw (especially Varmland).

Improved native types, which can be classed among good wheats, offer excellent material for further work of selection and hybridization. Several crosses have already been made between these types and the Svea and Thule varieties at Ultuna, and the

products of the crossing are at present under examination.

The following are some comparative data on the productivity of Ultuna wheats furnished by a series of cultural experiments: Bore, 32.4 bushels per acre; Thule II, 42.0 Svea, 46.5; Latorp, 46.5; Varmland, 46.4; Vasternorrland, 46.0; Svalofs Sammetsvete, 41.0.

Sol (a high producer) and Pansar (very resistant to rust), cannot, by reason of the climate, penetrate into Svealand, but it may well be that, in the future, with suitable recrossing, these excellent wheats may become more resistant, and be able to withstand the climatic conditions of Malaren.

716.—Improvement in Strawberries in America by Hybridization and Selection; New Types of Strawberries with Continued Production.—VAN FLEET, W., in the *Journal of Heredity*, Vol. X, No. 1, pp. 12-16, Washington, January 1919.

Varieties of strawberries which, under favourable weather conditions, continue to bear fruit throughout the summer and autumn after having given a good yield in spring are more and more appreciated by growers. These types which produce continuously have the stolons very slightly developed and an abundant formation of tufts of fertile branches. They are all derived from Pan American, which originally was a mutation from the Bismark, an old commercial variety of *Fragaria Virginiana*.

Among the new types the first place is held by Progressive and Superb, which are rapidly propagated by seed and subjected to suitable crosses with European Alpine varieties of *Fragaria vesca* with the object of adding valuable new characters. *Fragaria vesca* (both the European and Mexican types) cannot flourish in North America because of the excessively hot summer, and the fruit, although fragrant, is small and not very firm.

In 1914 Prof. W. F. Wight, of the U.S. Bureau of Plant Industry, who had been sent out to Chile as Agricultural Explorer, sent the Bureau seeds of a strawberry of the Alpine type (*Fragaria vesca*) bought on the market of Santiago. He was unable to discover their exact origin. These seeds were sown in the Experimental Acclimation Gardens at Rockville, Md., and Chico, Cal., and plants were obtained of vigorous growth, high productivity, and a capacity of adapting themselves to the climatic conditions of the United States superior to that of any other variety of *Fragaria* hitherto studied. The characteristics of the new strawberry (No. 35,005) obtained are:

- (1) Resistance to the hot, dry summers of North America.
- (2) Continuous production from June till the first autumn frosts.

(3) The fruit is fine and large, but not very firm and, in this respect, inferior to the fruit of *Fragaria Virginiana*.

(4) Abundant formation of sterile branches accompanied by an abundant production of stolons. In this respect the new Chilean variety is distinctly superior to the *Virginiana* types with a continuous production and floral ramifications but a low stolon production.

In order to combine the positive characters of the South American variety with those of the *Fragaria Virginiana* variety, a series of crosses were started in February, 1916, on the Bell Experimental Plot at Glendale, Md., between the South American type and the two varieties Early Jersey Giant and Chesapeake. The hybrids thus obtained the characters of the parents in good proportions:—

(1) Uninterrupted production from July till November;

(2) in addition to the very copious formation of fertile branches there is an abundant formation of stolons;

(3) the fruit is fine, large, and compact.

Attempts are also being made to fix and propagate a new type which would satisfactorily replace the Pan American variety, which, as has been said, has the disadvantage of too slight a formation of stolons.

717.—**Strawberry Hybrids Resistant to Cold in Alaska.**—GEORGESON, C.C., in the *Report of the Alaska Experiment Station*, 1917, p. 27. Washington, 1919.

The strawberry hybrids Nos. 320 and 275 obtained at the Sitka Experiment Station (coastal district) proved capable of resisting and flourishing at Rampart, in the Yukon Valley, without any further protection than that offered by the snow. It should also be noted that the fruit is of better quality, sweeter and firmer at Rampart than at Sitka. This is perhaps because in the interior the summer is warmer and drier.

722.—**The Effect of Certain Organic Substances on Seed Germination.**—FRED, E. B., in *Soil Science*, Vol. VI, No. 5, pp. 333-342. Bibliography of 27 publications. Baltimore, November 1918.

Previous experiments have shown that green manure is unfavourable to the germination of certain seeds, the injurious factor being attributable to certain soil fungi. A continuation of these investigations gave further data on the effect of different organic compounds on germination. The results obtained showed that alfalfa powder, casein, and peptone, have little or no effect on the germination of different types of seeds except when used in large quantities. There is, therefore, no relation between the injurious effect of green manures and their nitrogen content. The reduced germination due to

the application of excessive quantities of casein or alfalfa powder is not further reduced by applying calcium carbonate.

Sugar delays germination and, at the same time, favours bacterial development and also reduces the germination percentage. The retarding action of sugar on the germination of seeds is due to the large amount of carbon dioxide formed during the decomposition of the sugar.

Sterilization of the soil inhibits the germination of seeds to a considerable extent.

724.—**Cultural Trials of Different Varieties of Wheat, Barley and Oats in Seeland, Denmark.**—JACOBSEN, A.P., in the *Beretning on Landboforeningers Virksomhed for Planlægningen paa Sjælland*, 1918, pp. 529-533. Copenhagen, 1919.

Wheat.—At Borandhofgaard (Isle of Moen) the following yields of wheat per acre have been obtained: Dronning Wilhelmina II, 62.5 bushels; Smaahvede II, 55.5; Rodhvede (red wheat), 55.3; Tystofte Standhvede II, 44.6.

At Roskilde (a locality situated at the extremity of the fjord of the same name, on the northern coast of Seeland) the wheat Smaahvede II surpassed even Pansar of Svalof, for it produced 47.6 bushels of grain per acre, as compared with 42.6 bushels for the latter.

At Kallundborg (western coast of Seeland) Tystofte Smaahvede 53.5 bushels per acre, surpassed Dronning Wilhelmina, 50.6 bushels.

On the general average Tystofte Smaahvede II occupies the first place; it is also, as a matter of fact, the favourite and most widespread variety in Seeland. In very fertile soil, where winter conditions are not too unfavourable, Dronning Wilhelmina may give excellent results.

Barley.—Among the 2-rowed varieties, Tystofte Prentice takes the first place; it produced (average of 6 trials) 4.3 bushels of grain and 1146 lbs. of straw more than the Svalof Gullkorn variety (yellow barley of Svalof). It surpassed also in yield Abed Juli and Tystofte Korsbyg (6-rowed barleys).

Oats.—Sorts studied:—Svalof Seger, Svalof Kron, Tystofte Stjern, Tysk Gulhavre (German yellow oats) Svalof Guldregn. The Svalof Seger gave the best results.

725.—**Cultural Trials of Different Varieties of Two-Rowed Barley, in Denmark.**—KARSTEN, in the *Tidskrift for Planlægning*, Vol. XXVI, Pt. I, pp. 1-36. Copenhagen, 1919.

Numerous cultural trials have assigned to the Archer (Prentice) variety the leading place from the point of view of grain yield. The different varieties sprung from Prentice, that is to say Svalof's Princess, Lyngby

Prentice, Tystofte Prentice and Abed Prentice, do not differ from one another morphologically.

The cultural trials, aimed at comparing the qualities of Tystofte Prentice (which may be considered as a representative type of the varieties 'sprung from Prentice') with those of six new sorts of 2-rowed barley created at Svalof and Abed: that is to say: (a) Abed Binder, Svalof Golden and Svalof Hannchen, with early maturity and strong straw; (b) Tystofte No. 40, Abed Rex and Abed No. 570. These cultural trials were made during the four years 1913-1916, in seven localities differing in climate and soil.

The average yields in bushels per acre were: Tystofte Prentice, 55.2; Tystofte No. 40, 50.8; Abed Rex, 55.2; Abed No. 570, 52.1; Abed Binder, 55.1; Svalof Golden, 53.9; Svalof Hannchen, 51.7.

The tendency to lodge, expressed in relative values from 1 (=standing straw) to 10 (=loded straw) was as follows: Tystofte Prentice, 5.6; Tystofte No. 40, 3.2; Abed Rex, 3.6; Abed No. 570, 4.5; Abed Binder, 2.0; Svalof Golden, 2.3; Svalof Hannchen 2.9.

In comparing these figures with those of the yields it is seen that the yield of each of the varieties tested is in strict agreement with their respective degree of tendency to lodge.

734.—The Effect of Fertilizers on the Composition of Hops.—RUSSELL, G.A., in the *Journal of Industrial and Engineering Chemistry*, Vol. XI, No. 3, pp. 218-224, Easton, Pa., March 1919.

The field experiments described were carried out during three consecutive years on high land in irrigated alluvial soil. In each case there were fifteen plots, each fertilized in a different manner, and control plots.

It was found that the production per acre of soft resins (extracted with petroleum ether) is greater in irrigated and fertilized soil. This is, however, due to the greater vegetative development of the hop as the percentage of soft resins in the cones is reduced. The results showed no appreciable superiority of one fertilizer over another or a mixture of fertilizers with respect to the production of soft resins per acre. From an economical point of view soft resins are the most important constituent of hops.

The soluble ash content is not appreciably affected either by the use of fertilizers or by irrigation.

738.—The Management of Fruit Trees Before Plantation.—TRUELLE, A., in *La Vie agricole et rurale*, Year IX, No. 10, pp. 182-196. Paris, March 8, 1919.

The operation of "dressing" (habillage) a tree before planting is well known and the author quotes experiments made on this

procedure, which has the double end of trimming the tree and establishing a balance between its subterranean and aerial apparatus.

There is another operation that is much less used but ought to be used more often, as trees removed from the nursery have often to wait a long time before being planted. This operation, known in France as "pralinage," consists in plunging the root system of the tree for a few seconds in a mixture made of clay, a fertilizer and water. The mixture should be so thick as to stick to the roots and form a covering. The proportions used vary.

The aim of the operation is to give back their freshness to the roots and rootlets that are more or less dried up by their journey from the orchard or by the heat of the sun and provide them with food that they can make use of immediately, so that the tree will "take" more quickly.

The mixture consists of clay with cow-dung in the proportion of 1/3 of the former to 2/3 of the latter, sufficient water being used to obtain the required consistency.

It is advisable to mix 5 shovelfuls of clay with 3 of cow-dung and dilute the mixture with sufficient water to make a "clear soup."

The stems can also be treated with this mixture by using a large brush, but it is best to lime them, as lime is the chief constituent of the mixture used for coating, white-washing and spraying stems.

The operation is intended to prevent the young trees, which being sheltered by one another in the nursery, have tender bark, from hardening it rapidly when they are finally planted under the influence of the sun and wind, in which case the bark would lose its elasticity, the stem would grow in girth more slowly and the flow of the sap would be hindered. For this purpose, fairly concentrated milk of lime is used, mixed with $\frac{1}{4}$ its volume of clay or loam so that the coating will not be easily washed off by the rain.

741.—The Identification of Timber by the Colouring Matter it Contains.—JAUFRET, A., in the *Comptes rendus de l'Académie des Sciences*, Vol. 168, No. 13, pp. 693-694. Paris, March 31, 1919.

The study of the colouring matter in wood is not only of practical interest, but also enables the species to which the wood belongs to be identified by examining the colour reactions and the absorption spectra of the colouring matter.

An example of this is furnished by the author's researches on two *Dalbergia* from Madagascar; *D. Perrieri* Drake, and *D. ikopensis* Jum. and Perr. Normally, the former has a colour like wine lees, while the latter is a less dark brownish red. After soaking for 24 hours in 95° alcohol, the powdered wood of *D. Perrieri* gives a solution

that when filtered is red, and which turns orange on adding sulphuric acid. Under the same conditions the solution from *D. ikopensis* is orange coloured, is not changed by sulphuric acid, and is turned orange brown by caustic soda, etc. On the other hand, the powders of these two woods give differently coloured solutions on treatment with ether, chloroform and benzene; their alcoholic solutions also give different absorption spectra.

The author has found that these characters are constant for a given species by studying numerous species all of which, from this point of view, have quite distinct characters. It will be seen how *tables based on these reactions and on the absorption spectra of these coloured solutions would be useful for the identification of timber* in general, and especially for timber imported under indefinite names, provided that these tables are gradually drawn up with the help of samples of known botanical origin.

LIVE STOCK AND BREEDING

744.—**Destruction of Tetanus Antitoxins by Chemical Agents.**—BERG, W.N., and KELSEY, R. A., in the *Journal of Agricultural Research*, Vol. XIII, No. 10, pp. 471-495. Bibliography of 16 works. Washington, June 3, 1918.

The aim of these researches was to contribute to the solution of the problem of the chemical nature of antitoxins and their preparation in a pure state, and incidentally to ascertain whether an antitoxin is, or is not, the same thing as a seroprotein. The method used consisted in submitting the antitoxin preparation to the action of artificial digesting reagents and finding, by determining the coagulable protein and the amino-nitrogen, the quantity of antitoxin that remained in the different mixtures. The work primarily concerned the serum of bacterial anthrax, but as the results were not conclusive, most of the work was limited to tetanus serum and tetanus antitoxin. These were treated with solutions of trypsin + sodium carbonate and trypsin + hydrochloric acid for a relatively long time. The proportion that had been digested was then measured and the remaining toxin was kept for the inoculation of guinea pigs.

The authors found that tetanus antitoxin in a 0.5% solution of sodium carbonate was slowly, but completely, destroyed. At the same time, they did not find any important chemical changes in the proteins. In neutral or solutions faintly acid to litmus paper, trypsin destroys the antitoxin while, at the same time, the associated proteins are destroyed. The quickness with which the antitoxin was destroyed and the protein

decomposed was essentially the same. Similar results were obtained with solutions containing trypsin + 0.5% of sodium carbonate. Tetanus antitoxin in 0.2% hydrochloric acid was completely destroyed in 3 days or more; during this period, no important chemical changes were observed in the proteins. In neutral solutions, pepsin has no action on the antitoxin. Proteolysis and the destruction of the antitoxin proceed simultaneously in pepsin + hydrochloric acid.

The inference from these results is that the antitoxin is of a non-protein nature. But the stability of the antitoxin depends so much on that of the protein to which it is attached, that when the protein molecule is decomposed, so is the antitoxin.

748.—“**Lammparalysi**” (Paralysis of Lambs), a New Disease of Sheep Observed in Sweden.—MAGNUSSON, H., in *Landtmannen Tidskrift for Landman*, Year II, No. 1, pp. 7-8. Stockholm, January 1919.

Of late years a new disease of sheep has been observed in various countries. This disease is characterized by neuromuscular disturbances and is similar to that known as “trembling” (“travarsjuka”). The disease appears from year to year in the same flock.

So far the etiology of the disease is very obscure; post mortem examination reveals no lesions in the medulla or brain. No micro-organism that might cause the disease has been discovered, and inoculation tests on healthy animals have given no results. The symptoms of the disease are as follows:—when the lamb is 2 to 3 weeks old it loses control of its hind legs; when it stands up it can hardly walk more than 10 yards or so, when it falls down; after a few minutes, it gets up, walks a few yards, then falls down again so exhausted that it cannot get up again. The paralysis soon spreads to the front legs and if the animal is lifted up by the skin of its back, its legs dangle as if it had no control over them. At first, the general condition (temperature, appetite and digestion) is normal, but it gradually becomes worse and the animal finally dies of exhaustion. Various remedies, as well as change of food (giving foods rich in matter that assists bone-formation), have been tried, but without avail. The only thing to be done is to slaughter the animal and, as the disease persists from year to year, flocks with affected lambs should be replaced.

As far as is known to the author, the disease has not been studied anywhere in spite of its serious nature. In Peru, where it is known as “renguera” it attacked 10,000 lambs in one year and severe measures have been taken to eradicate the disease, the nature of which it is hoped will soon be revealed by research work.

752.—The Physiological Basis of Feeding and the Importance of the Ratio Fat: Protein.—MAIGNON, F., in the *Comptes Rendus des Séances de la Société de Biologie*, Vol. LXXXII, No. 12, pp. 400-401. Paris, May 3, 1919.

In previous experiments, the author had drawn attention to the part played by fats in the utilization of proteins while his researches considered generally, clearly show that there is a minimum of fat necessary for the economic and non-toxic utilization of the proteins. The part played by the three organic nutritive principles can be defined as follows:

(1) that of the *proteins*: to provide the nitrogen required to repair the wastage of the tissues;

(2) that of the *fats*: to intervene in the utilization and assimilation of the proteins;

(3) that of the *carbohydrates*: to provide the energy required to maintain physiological activity.

In other words, a ration for an adult animal should contain:

(1) *the food for wastage*: the amount of protein required to repair the wastage of the tissues;

(2) *the food for nitrogenous utilization*: the minimum of fat needed to assure the economic and non-toxic utilization of that protein;

(3) *the food for energy*: a quantity of carbohydrates corresponding to the amount of energy used up in physiological work.

The fat: protein ratio, for this reason, becomes of prime importance in feeding, because it controls the utilization of the nitrogen.

In the natural feeding of young animals—suckling mammals as well as birds in the foetal period—as well as in the meat food of adults, this ratio is equal to 1, or very close to unity.

As the average composition of the milk of domestic mammals is per cent:—4.25 of nitrogenous matter, 4.11 of fat and 6.13 of lactose, partially skimming the milk, as is done in large towns (in France), may have the effect not only of diminishing its food value but also of causing the utilization of its proteins to become toxic.

In the hen's egg, the proportions of nutritive principles are 12.55% of nitrogenous matter and 12.11% of fat.

Mayer and Schaeffer have shown, for meat, the existence of a proportion of fatty acids equal, on an average, to 14% for the sartorial muscle of the dog; this gives 15 or 16% of fat, while the average quantity of proteins varies around 18%.

754.—Comparative Toxicity of Cottonseed Products.—WITHERS, W. A., and CARPETH, F. E., in the *Journal of Agricultural Research*, Vol. XIV, No. 10, pp. 425-452. Bibliography of 16 publications. Washington, September 2, 1918.

Many cottonseed products (seeds in their natural state, seeds extracted with ether, gossypol, and various cottonseed meals) have been fed to rats, rabbits, hens, and pigs. Seeds in their natural state and the gossypol extracted from them proved very toxic to all these animals. Boiling the seed, as is done in oil factories, greatly decreases the toxicity. So marked is the effect that well-cooked products have no pronounced poisonous action on rats and poultry when administered in suitable diets. The boiled meals, however, appear absolutely injurious to rabbits and pigs, which are particularly susceptible to this form of poisoning, but rats and poultry can withstand much larger relative quantities of meal for a much longer period. When the cottonseed oil is extracted by pressure in the cold, large quantities of the toxic substances pass into the oil, so that the meal is much less toxic than that obtained by pressure in heat.

Except for a certain decrease in laying, excessive quantities of cottonseed cake do not appear very injurious to hens. The presence of unmodified gossypol in the diet may cause a peculiar discolouration of the yolk.

Pigs were subjected to various diets with the object of comparing the effect of cottonseed cake with that of other similar concentrated protein foods, such as peanut meal, soybean meal, and cottonseed extracted with ether. Attempts were made to eliminate the toxicity by adding to well-cooked cottonseed cake either meat scraps, calcium lactate, sodium chloride, and butter fat, or 10% of skim milk powder as supplements. Improving the ration by the addition of good foods does not inhibit the injurious action of cottonseed meal on pigs. This injurious action is not produced by similar foods. The poisoning of pigs fed on cottonseed meal is, therefore, due to the presence of a toxic substance, not to a defective diet. The authors believe this toxic substance to be a gossypol derivative which they have named D-gossypol.

756.—Breeds of Light Horses, in the United States.—REESE, H. H., in the *United States Department of Agriculture, Farmers Bulletin* No. 952, 16 pp. Washington, June 1918.

Detailed information is given of breeds of light horses best suited to mountain or hilly country or where there is great demand for saddle or light draught horses.

The breeds described are:—Arab, Thoroughbred, Standard-bred, American saddle, Morgan, Hackney, French coach (the

military horse produced in France, largely with state aid, and known in that country as half-bred), German coach (name given to various breeds of horses produced in Germany for the army, and more especially for the artillery), and Cleveland Bay.

The principal light breeds in the United States are the Standard-bred, American Saddle, and Morgan.

Appetite as a Guide in Feeding Dairy Calves.—McCANDLISH, A. C., in *Iowa Agricultural Experiment Station Research Bulletin*, 51, pp. 179-184. Ames, Iowa, 1919.

A Guernsey bull calf aged 70 days, an Ayrshire heifer 37 days old, and a Holstein heifer 30 days old were allowed free choice of several concentrates (in separate compartments of a self-feeder) and alfalfa hay for two 30-day periods. They were also fed "what milk was thought to be suited to their needs," and had access to salt, charcoal, and water, the amounts taken being recorded. The average initial weight of the calves was 122 lbs., and the average final weight 241 lbs.

The amounts of the various feeding stuffs eaten are given in the following table:

Period	Whole milk	Skim milk	Corn	Oats	Hominy feed	Gluten feed	Wheat bran	Linseed meal	Alfalfa hay	Nutritive ratio
Days	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1-30	864	168	1.3	59.1	0.0	15.3	13.3	62.7	32.7	1.3.4
31-60	678	678	108.9	68.9	0.3	1.9	17.3	75.6	91.9	1.3.5

It is pointed out that the calves responded to an increased proportion of skim milk by consuming a greater proportion of concentrates low in protein. It is stated that a ration for these calves conforming to the modified Wolff-Lehmann standard would have a nutritive ratio of 1:4.3 in the first period and 1:4.4 in the second. The consumption of total digestible nutrients was above that called for by the feeding standard.

The corn was offered both shelled and cracked and the oats both whole and ground, but of the corn consumed only 0.3 lb. was cracked, and of the oats only 0.9 lb. was ground. Another manifestation of an aversion to ground grain was the small consumption of hominy feed.

757.—Digestion of Starch by the Young Calf.—SHAW, R. H., WOODWARD, T. E., and NORTON, R. P., in the *Journal of Agricultural Research*, Vol. XII, No. 9, pp. 575-578. Washington, March 4, 1918.

The aim of the authors was to determine the age at which calves begin to be able to digest and assimilate starch and starch foods. Ewing and Wells, in their work on this subject, found that if twelve-month old calves are fed a ration composed of maize silage, cottonseed meal and starch amounting to 47.3% of the total net energy of the ration, the iodine test does not show the presence of starch in the faeces. F. Kruger (*Die Verdauungsfermente beim Embryo und Neugeborenen*, Wiesbaden, 1891), in his work on embryo and new-born calves found that the salivary glands secreted ptyaline as early as the seventh month of the life of the foetus. Although the quantity of ptyaline secreted gradually increases till birth, it is still too slight at this last period to play any part, however small, in digestion.

The authors took as subjects two four-day old calves. These were given at each meal 40 grm. of ordinary maize starch mixed with milk for three days. They were then given whole milk only for five days, then milk and starch for three, and so on, till one of the animals was 39 days old and the other 31.

At the age of four to seven days one of the animals digested 22.02 and the other 20.3% of the starch eaten. When the first was from twelve to fifteen days old the percentage of starch digested had more than doubled, at three weeks it had almost tripled, and at four weeks exceeded 90%. At the age of three weeks the second calf could already digest more than 90% of the starch taken. It is probable that a calf a few hours old is incapable of digesting any appreciable quantity of starch. These experiments, however, showed that the quantity of enzymes capable of decomposing starch must increase very rapidly during the first days of life because, already at the age of three or four weeks, the subjects could digest a ration containing starch in amounts equal to 10% of the total dry matter. The milk ration of a calf a few days old may, therefore, be supplemented by a starchy food, the quantity of which may be rapidly increased as the animal grows older.

761.—Keeping Down the Costs of Pork Production.—HAYS, F. A., (Delaware Experiment Station), in *The Breeders' Gazette*, Vol. LXXV, No. 10, pp. 534-535. Chicago, March 6, 1919.

A test was undertaken by the Delaware Experiment Station to determine as accurately as possible the cost of a pig at weaning time when 60 days old. The experiment began on Nov. 1, 1917, and covered a period of 180 days, closing on April 29, 1918. Twelve Berkshire sows and one Yorkshire

sow were mated to a Yorkshire boar. These sows had been running on clover pasture with a limited grain allowance previously to Nov. 1 and were not carrying much flesh. After Nov. 1 they were fed corn at the rate of $1\frac{1}{2}$ per cent of the weight of the sows, wheat middlings and bran mixed in equal parts and supplied in a self-feeder, and tankage fed in another self-feeder. This ration was continued until December 15, or for a period of 45 days. At this date middlings were omitted as the sows were getting rather fat, and bran alone was fed with no other change in ration. On Jan. 1 the corn was reduced to about 1 per cent of the body weight of the sows. On Jan. 31 corn and cob meal was substituted for bran in the self-feeder, and this together with tankage self-fed was supplied to all sows until shortly before farrowing.

A few days before due to farrow each sow was removed to a community hoghouse and fed a thin slop of bran, middlings and tankage, with but little corn. As soon as each sow was on feed after farrowing she received all the thick slop, made of 30 parts middlings, 15 parts bran, and 5 parts tankage, that she could consume while suckling her litter for 60 days. In addition to the slop each sow received about 2 per cent of her body weight in ear corn during the suckling period and plenty of water. When her pigs were weaned each sow was returned to the original lot and fed as before farrowing.

At the age of one month all the young pigs were given access to hominy feed and oil meal, each self-fed, and after weaning they received the same amount and kind of slop that their dams had when suckling them. All were given the simultaneous treatment for cholera at 60 days.

The sows made an average daily gain for the six months' period of 0.33 lb. They consumed on an average 2.8 lbs. of grain per 100 lbs. live weight during the six months. They consumed as low as 2 per cent of the body weight in grain daily, while at maximum milk production the consumption often was as high as 4 per cent of their body weight. It was found both economical and desirable to feed the sows to their maximum consumption while suckling the pigs for sixty days. The cost of gains in the pigs was greatly reduced through this system of feeding.

The average number of pigs farrowed per sow was 9.9; the average birth weight of pigs was 2.47 lbs; the average weight per pig on April 29 was 29.57 lbs.; the average daily gain per pig was 0.46 lb. and the average number of pigs raised per sow farrowing was 6.6. The average amount of grain eaten daily per pig was 0.15 lb. and the grain required per 100 lbs. gain was 30.1 lbs. The cost of grain per 100 lbs. gain of pigs was 82 cents. When we consider the advantage in increased gains that may be secured by using a creep we are forced to admit that a very small amount of grain produced wonderful results in these pigs.

The interest on the investment was figured at 5 per cent for the six-month period. Charge for the simultaneous treatment was \$2. A shelter charge of 25 cents per sow was made and a boar service fee of \$1 per sow. The labour charge per sow was \$3.75 and the estimated value of the manure \$8. The average total expense per pig weighing 29.57 lbs. at 65.3 days old was \$3.93. The feed prices used are those current at the time of working on the experiment, and they represent war-time prices.

The conclusions may be drawn from this experiment that the cost of producing a pig at weaning time depends upon two main factors: First, the average number of pigs raised per sow, and second the feed cost of sows and pigs. By selecting prolific females and flushing them at breeding time the first cost item may be greatly reduced. By buying feeds in quantity, using forage crops, using a self-feeder, and feeding an entirely complete ration liberally the second cost can be kept down.

The Problem of the Inheritance of Egg Production.—GOODALE, H. D., in *The Journal of the American Association of Instructors and Investigators*, Vol. 5, No. 10. Reprinted in *Utility Poultry Journal*, Newport, Salop, April 1920.

Breeding for increased egg production in poultry has been successful in its aim, without however establishing the laws of its inheritance. It is impossible to devise a set of instructions that could be followed by a poultryman of ordinary intelligence, and which would enable him to proceed step by step in the development of a race of high producers, with the same certainty that a set of instructions could be devised for the production of a race of birds with certain definite morphological characters, such as pea comb, barred plumage colour, pigmented skin, silky, frizzled feathers, red earlobes, and grey iris. All that can be done with egg production is to tell a poultryman to use the progeny test, which is good as far as it goes, but does not go far enough. It is perfectly clear that number of eggs alone is not a sufficient basis for procedure. Just as the general appearance of a bird depends upon the character of its parts, e.g., comb, plumage, colour, etc., so the egg record depends upon its parts or elements. The inheritance of egg production, therefore, becomes the inheritance of its parts. If we knew the mode of inheritance of each of these parts, we could devise a set of instructions for the poultryman that would be as definite as those for producing a race of birds with a definite set of morphological characters such as was described. Having reached this conclusion, the next step is to work out the inheritance of each of the parts that are concerned in the determination of the egg record. The question that concerns us, then, is whether it is possible to achieve this

end. The question of the possibilities of improved egg production through selection is not under consideration. That fact is demonstrated. But selection alone is a half blind, slow and more or less unreliable mode of procedure, compared with the promise of procedure based on an exact knowledge of the mode of inheritance of the various elements of production.

There are, however, very grave and perhaps insurmountable difficulties to be overcome in determining the mode of inheritance of the elements involved in egg production. It is these difficulties that are discussed here in the hope that ways of overcoming them may come to light.

(1) Purity of stock. It seems unlikely that stock pure for any of the hereditary factors concerned in egg production is in existence. Yet if one is to learn the mode of inheritance of one of these elements, pure stock must be at hand. This difficulty is not insurmountable, but requires much preliminary work.

(2) Numbers. The advance in genetics makes it almost certain that the inheritance of the elements of egg production is fundamentally Mendelian in nature. Mendelian inheritance involves ratios. The required number of offspring from a pair will depend upon the number of genetic factors involved. If broodiness, for example, involved only a simple Mendelian ratio, ten or twelve female offspring would be sufficient, but if it involves more complex ratios, as is certain, then 30 or 40 female offspring per pair become necessary. The difficulty in obtaining large numbers involves a strain on physical facilities.

(3) The character, i.e., egg production, is expressed in one sex only. Here is a difficulty, not insurmountable, of two-fold nature. In the first place, it cuts the number of individuals available for study in two. Second, the genetic composition of the male can be known only through his breeding behaviour. If, therefore, a male is adequately tested, as one would test him for colour, a very large number of daughters are required.

(4) Management. Here rather serious difficulties are encountered, not so much in devising a scheme on paper as in executing that scheme. The labour question is perhaps the most important, because it is almost impossible to get two men who will do the work exactly alike and there are so many points all along the line where these differences leave their imprint. It could be solved of course, by getting men of the right temperament at the start and paying them enough to keep them. But it is a hard matter to convince the powers that be that such procedure is as necessary as a delicate balance, or other instrument, is necessary in a chemical laboratory.

(5) The four preceding difficulties can be solved by appropriate means, but the question of disease is far more serious. Clearly recognized disease is bad enough, but at least it is recognized as disease and the record treated accordingly. But the effects of disease are more far-reaching in several other respects. The question of resistance to disease is involved. Disease resistance does not always mean vigour, for a very vigorous bird may lack resistance to one disease but possess it for another, while a weak bird may possess resistance to both. Of course, it is important to have disease resistant strains, but their possession would not solve the matter unless they were so pure that non-resistant birds never appear. The question of disease is a problem by itself. The insurmountable part of the matter rests upon the fact that disease may be present, in sufficient amount to interfere with production, but otherwise not recognizable. How then can genetic interruptions in production, which certainly exist, be separated from non-genetic causes? Possibly, if sufficient number of expert poultry physicians were available to examine each bird daily, it might be possible to accomplish the separation. A suitable quarantine promises much, but thus far the necessary facilities have been lacking to try out this measure. Without exclusion of disease, at least its exclusion so that it becomes a negligible factor, all attempts to work out the inheritance of the following factors for egg production will be in vain.

Unless the investigator can show that disease can be neglected, all supposed solutions of the problem must receive the closest scrutiny.

It seems clear that disease cannot be neglected in studies of the fall pause, the winter pause, the rate of production, other pauses, probably also the cessation of production in the fall and the time of maturity. In studies of the inheritance of broodiness compared with non-broodiness, disease can be ignored but the question of the inheritance of degrees of broodiness is so bound up with egg production factors that it also requires a disease-free environment for its solution.

FARM ENGINEERING

570.—Type of Silo Used in Sweden for Storing Potatoes.—*Kungl. Landbrucks Akademien Handlingar och Tidskrift*, Year 57, Nos. 7-8, pp. 522-523. Stockholm, 1918.

On account of the food shortage and the need of preserving the chief foods in the best possible way, a description is given of a cheap and practical potato silo which is used in the south of Sweden. It is something between a cellar and an ordinary silo. A ditch, 12 inches deep and 8 feet wide and of the desired length is dug; stakes to support

the roof are stuck in the ground at such a height that the roof clears the potatoes, an air space of about 12 inches being left between the potatoes and the roof. The potatoes are piled up pyramided along the centre line and roofed over. The roof consists of a layer of planks lying on the supports, the planks being covered successively with a layer, 4 inches thick, of straw or dry leaves, a layer of earth 12 inches thick, a second layer of straw or dry leaves 4 inches thick, and finally a layer of earth 8 inches thick. In the side of the silo one or two doors, situated at the same level, are made, which can be opened in fine weather.

This device, which unites the advantages of the cellar with those of the ordinary temporary silo, can also be used for the storage of roots.

RURAL ECONOMICS

771.—**Farm Management.**—BOSS, ANDREW, (Minnesota College of Agriculture in *Hoard's Dairyman*, Vol. LVII, No. 9, pp. 428-462. Port Atkinson, Wis., March 21, 1919.

The writer confines himself to discussing four or five factors which have proved to be very important in securing profits from farming. These factors have been discovered through farm management investigations made in Rice County, Minnesota, and supplemented by information gained from investigation in other States. These investigations point out clearly the fact that among the most important factors in making the farm pay are: (1) the wise use of capital, (2) the efficient use of labour, (3) high yields of crops, and (4) large production from live stock.

The wise use of capital.—Every farmer should recognize the fact that the capital invested in his farm should be expected to earn at least as much interest for him, as money deposited in a savings bank. A farmer who invests his money in a farm simply chooses the farm as offering an opportunity for better returns than would the same money return if deposited in a savings bank, or invested in a farm mortgage, and it is just as much his business to see that it earns five or six or ten per cent, as it is for any man investing money in other lines of business, to see that it earns a good rate of interest. One of the most effective ways in which to make capital earn interest is to correctly proportion the amount of capital that goes into operating farms. Statistical data covering this point seem to indicate that from 25 to 33 per cent of the total capital available should be used as operating capital. If used for the purchase of good live stock, for the purchase of suitable machinery, for the employment of labour, and for the purchase of feeds and other

material, with which to keep the farm going, it will be in the safest form of operating capital.

On well equipped dairy farms and especially where pure-bred stock is kept the proportion of capital, in forms for operating, may run as high as 40 per cent, with excellent results.

One starting in the farming business should borrow money on the real estate and invest it in operating expense, first for the reason that it can be borrowed at a lower rate of interest on real estate; and second, because if ready cash is available more stock and equipment is likely to be purchased. With available capital for buying and selling, and for making a quick turnover when opportunity offers, the farmer, if good judgment is used, has many opportunities for making gains on his investment.

Efficient use of labour.—On every farm there is a certain amount of labour which must be used on non-productive enterprises. On some farms this may run as high as 42 per cent. On well diversified farms, and especially on dairy farms, it may run even as low as 26 per cent. On highly specialized farms it may run even as low as 20 to 22 per cent. Obviously where 80 per cent of the labour is expended on productive enterprises, such as heavy yielding dairy cows, quickly fattened hogs and large yielding crops, the returns are bound to be larger than where only 60 per cent of the labour is used for that purpose. No one would deny that when a person works by the hour his total compensation is greatest when he works a large number of productive hours. In the same way the farmer who works a large number of hours of productive labour can expect large returns for his effort. Investigations in Minnesota indicate that 3,000 hours is a good average year's work for a farm hand or farmer. This means ten hours a day for 300 days in a year. Some farmers will contend that they work more than that, but records kept of their time indicate that they work less rather than more. Farms on which all of the farmhands work an average of 3,000 hours each, paid a very much better rate of income than those on which the farmhands work an average of 2,000 hours. Some farms were found where the average number of hours of work per year was only 1,500. Of course these men received very low returns on their farms because actually they did only half a year's work. Three thousand hours of work per year per man, 80 per cent of which or 2,400 hours, per year spent on productive enterprises, is a large factor in securing large returns from the farm.

Large crop yields.—People in a general way know that large yields of crops are a desirable thing. That is why farmers try to settle on good land. The importance of large yields

has been clearly brought out in farm management surveys. On any farm where the yields are higher than the average for the community, the labour income of the farmer is found to be comparatively high. It can hardly be otherwise because the farmers of a community usually all sell on the same market and for approximately the same price. Therefore the one who has the most to sell is likely to have the largest returns. The cost of growing large crops is very little more than that of growing an average or a lower than average crop. Consequently any increase in yields over the average is almost clear gain.

High production from live stock.—Students of dairying have told us that cows giving less than 225 pounds of butterfat were merely boarders on our hands. With the present high prices of feed it is doubtful whether they are not still boarding when they give as much as 250 pounds of butterfat. The cost of maintaining a cow that gives 250 pounds of butterfat is almost as great as the cost of maintaining a cow that gives 350 or 400 pounds of butterfat. There is no way in which a farmer can lose the profit from his crops so quickly as by feeding them to low producing cows or other live stock. It is just as important that crops be fed to quick growing or rapidly fattening meat animals, as it is that they be fed to high producing ones. That is the only way in which profit can be made on the manufacture of feeds into meat products. Young animals well fed from birth and raised on a good quality of farm roughage and rapidly fattened on reasonable amounts of grain feed, offer an almost certain source of profit and give good returns for labour employed in that way.

These four points may be set down as the cardinal ones in making a farm pay. There are said to be 196 other points and all have an influence on returns from farming. More of them undoubtedly will become accepted principles of farm management, but none will, we feel sure, prove to be more important than the ones just discussed.

AGRICULTURAL INDUSTRIES

778.—A Study of the Streptococci Concerned in Cheese Ripening.—EVANS, A. C., in the *Journal of Agricultural Research*, Vol. XIII, No. 4, pp. 235-252. Bibliography of 23 publications. Washington, April 22, 1918.

Generally streptococci may be divided into three groups: (1) pathogenic streptococci, which differ in their virulence, and elective capacity for certain organs, as well as in certain bio-chemical reactions; (2) the ordinary streptococci of the udder, the intestines, the saliva, which, in so far as is known, differ from the first group principally in their lack of virulence; (3) *Streptococcus lacticus*, which makes milk sour. The

author studied streptococci from another point of view, viz.: (4) as producers of substances giving special flavours and as agents of other changes taking place in foods prepared with the aid of fermentation, and particularly in the ripening of cheese.

The streptococci belonging to these four groups differ so little from each other that the question has arisen whether they are not really varieties of one species. As a rule, however, several species are recognized. The streptococcus which is active during the ripening of cheese is *S. lacticus*. Nevertheless, several workers have isolated from different cheeses many varieties resembling *S. lacticus* in all points except in their behaviour in lactic cultures. To distinguish these varieties from *S. lacticus* the author calls them "cheese streptococci."

Cheese streptococci are usually found in soft or hard cheeses, of various types and classes during the process of ripening, as well as in other foods prepared by fermentation (in the mash with which the Japanese sauce known as "soya" is prepared, in the Chinese soybean cheese known as "tofu"). A study of the streptococci of the mouth, faeces and udder would probably show them to belong to the same type as the cheese streptococci.

The author gives a cultural and biochemical description of *S. lacticus* and two other species, one of which he names temporarily *Streptococcus X*; the other is identical with Freudreich's *Streptococcus b*, called *S. Kefir* by Migula. The most marked biological characteristic which distinguishes the other two species of streptococci described from *S. lacticus* is the small quantity of acetic acid produced by them in lactic cultures. *S. Kefir* is well known in the dairying industry for its large production of carbon dioxide in suitable media.

The author proved experimentally that cheese streptococci modify appreciably the flavour of cheese prepared with pasteurized milk. *Streptococcus X*, *S. Kefir*, and another hitherto unclassified strain of streptococci, improved the flavour and hastened the softening of Cheddar cheese made with pasteurized milk. *Streptococcus X* and *S. Kefir* also gave a peculiar flavour to soft cream cheese prepared with pasteurized milk.

Trend of the Cheese Industry in the United States and Other Countries.—PITLIE, T. R., in *United States Department of Agriculture, Circular 71*, p. 24. Washington, D.C., 1919.

The author presents a series of charts showing graphically the changes in the amounts of cheese made in the United States and the volume of exports and imports since 1850, together with similar information about cheese making and the cheese trade in Canada, New Zealand, the Netherlands, the United Kingdom, Switzerland, France, and other countries. The charts show in

particular the development of the factory system in the United States and the stimulating influence which it has had on production in other countries. They show also the injurious effect on exports of the "filled cheese" episode in the history of American cheese making.

Countries exporting those varieties of cheese which are especially used for savory purposes appear to have enjoyed a continuous export demand. The variations in their exports are not so marked as in those that made the Cheddar type of cheese.

The annual cheese consumption in the United States has been less than 4 lbs. per capita during practically all the time of record, and has never reached 5 lbs. per capita as a national average. For the most part the per capita consumption of cheese has been less in the countries using only a few varieties than in those where numerous varieties are used.

Trend of the Butter Industry in the United States and Other Countries.—PIRTLE, T. R., in *United States Department of Agriculture, Circular 70*, pp. 24, Washington, D.C., 1919.

This publication summarizes in graphical form the available statistics as to butter production in the United States (since 1850), Australia, New Zealand, Canada, and Sweden; and the butter trade of these and 10 other countries.

With regard to the butter industry of the United States it is held that farm butter making, and consequently the production of renovated butter, is definitely on the decline. Butter made in the United States has been a very small factor in the international butter trade. Before the European war Great Britain and Germany were the principal butter-importing nations, drawing their supplies from the smaller European countries and from Siberia, Australia, and New Zealand.

The great Danish export trade has been built up within the last 25 years. Important aids in its development have been the invention of the cream separator in 1879; co-operative dairying, beginning in 1882; co-operative factory management in 1887; the use of milk records about 1895; and the "Lurmarke" or national trade-mark, established by law in 1906. Stringent laws control the quality of Danish export butter.

The export butter business of nearly all countries shows noticeable fluctuations in short periods of time, indicating that the balance between domestic supplies and the profitable foreign outlet is delicate.

Trend of the Dairy Cattle Industry in the United States and Other Countries.—PIRTLE, T. R., in *United States Department of Agriculture, Circular 7*, pp. 19, Washington, D.C., 1919.

Charts are presented showing graphically the changes that have taken place since 1850 in the "cattle" and "cow" populations of the important dairy countries of the world as far as these are revealed by census and other official statistics.

A widespread tendency for dairy stock to replace beef and work animals is noted, particularly in countries dependent on imported feeding stuffs. Over long periods of time dairy cows have shown less fluctuation in numbers than total cattle, and have been much less affected by drought, wars, and similar conditions.

PLANT DISEASES

784.—Intumescences, With a Note on Mechanical Injury as a Cause of Their Development.—WOLF, F. A., in the *Journal of Agricultural Research*, Vol. XIII, No. 4, pp. 253-259. Washington, April 22, 1918.

During the first half of June, 1917, a storm of such velocity that it uprooted trees of considerable size raged round Raleigh, North Carolina. A few days later, when visiting the sandy soils to the east of the town, the author noticed that the leaf surface of cabbage (*Brassica oleracea* f. *capitata*), and especially the lowest leaves and the tips of the inner leaves, were covered with numerous growths distributed irregularly. In shape they varied from hemispherical to short cylindrical, and in colour from yellowish to greyish. Sometimes these growths were merely points, at others they had a diameter of 3 mm. In extreme cases the growth was twice as thick as the leaf of the cabbage.

These growths were believed to result from lesions produced by the sand driven by the wind. Later this supposition was confirmed by the results of experiments, made both in the open and under glass, in which sand was projected violently against normal cabbage plants. The growths produced were identical in appearance and structure with those found naturally. It was not possible to produce these growths on the ripe parts of the plants, but only on the actively growing tissues. It was observed later that the moisture and freshness of the tissues influenced the development of the growths.

This appears to be the first time that lesions of mechanical origin have been reported as causing the formation of growths on vegetable organisms. The immediate cause of the injuries is believed to be some absorption phenomenon and is due to an increase in the hydration capacity of the cellular colloids resulting from acids produced by oxidation.

Nature and Control of Apple Scald.¹—BROOKS, C., COOLEY, J.S., and FISHER, D. F., in *Journal of Agricultural Research*, Vol. 18, No. 4, pp. 211-240. Washington, D.C., November 15, 1919.

A contribution from the Bureau of Plant Industry, U.S. Department of Agriculture, in which the authors summarize their earlier work on the nature and control of apple scald, and give the results of more recent investigations on this subject. A list of cited literature is included.

The experiments as a whole show that the occurrence of apple scald is determined by orchard, packing house, transportation, and storage conditions. Mature fruit has, in general, scalded less than immature, but fruit in which the surfaces were just changing from green to yellow have scalded worse than those that were a leaf green and worse than those that had more completely changed to yellow. Well-coloured red fruit surfaces have been practically immune to scald.

Apples from trees receiving heavy irrigation have scalded worse than those from trees receiving light irrigation. This was found not to be due to the greater number of large apples in the former case, but to some forcing effect that increased the susceptibility to scald in both large and small apples. Delayed storage has increased or decreased apple scald, depending upon the amount of aeration the apples received during delay. Apples in ventilated barrels have developed less than one-third as much scald as those in commercial barrels when both were held in a storage room that received an occasional ventilation, but where the storage room received little or no ventilation the ventilated barrels caused but little decrease in scald.

The amount of scald developed in cold-storage plants has varied greatly with the location in the room. Apples near the aisle or near a door have scalded far less than those in the bottom of the stack. Boxed apples exposed to a continuous air current of 0.88 mile per hour in a commercial storage plant have been practically free from scald, while similar apples that did not receive the constant fanning became badly scalded. Stirring of the storage air has been found more important than its renewal in the prevention of apple scald. The ordinary commercial apple wrappers have caused but little decrease in scald, and paraffin wrappers have been but slightly better, but wrappers impregnated with various fats and oils have either entirely prevented the disease or reduced it to a negligible quantity. In barrel experiments in which only part of the fruit was wrapped, scald has been greatly reduced on the apples adjacent to the wrapped ones as well as on the wrapped apples themselves.

Typical scald has been artificially produced in a few days' time by exposing apples to the vapors of ethyl acetate, amyl acetate, or methyl butyrate. The manner in which scald can be produced artificially and the different methods of control indicate that the disease is due to the accumulation of esters or similar products of the apple in the tissues of the fruit and in the surrounding air. The vapours of these substances can be carried away by air currents or absorbed by fats and oils.

786.—Recent Biological Researches on the Rusts Affecting Cereals.—LOPRIORE, G. (Communication).

The "rusts" fungi parasitic on many cultivated plants, are both widely spread and difficult to control, on account of the many and powerful means of reproduction they possess. In fact, we have neither direct, nor indirect—preventive or curative—means of control that hold out hopes of success.

If we consider one of the commonest heteroic rusts, that is, one of those that require two different host-plants to complete its life cycle, such as the *Puccinia graminis* of wheat, we see that the appearance of the first uredo pustules, known as "yellow rust," may be caused by infection (either with aecidiospores (*Aecidium Berberidis*) or with uredospores (*Uredo graminis*) and that some 8 to 10 days suffice for incubation from germination up to the formation of new pustules).

The first uredinia may, in addition, be due to direct infection with sporidia from teleutospores or hibernating spores (*P. graminis*), without the intervention of the aecidial stage, which precedes them. According to recent researches, they may also be due to a latent germ capable of being transmitted from one growth period to another through seeds or stolons, and of commencing growth with that of the host-plant. But, unlike the other two methods of reproduction, these latter require a much longer incubation period, varying from 2 to 10 months.

It may be noted that while some observations appear to show direct infection by means of teleutospores, others, equally worthy of consideration, appear to show the existence of a latent germ, living in symbiosis with the plasma of the seeds or stolons, and on which Erikson has founded his theory of "mycoplasmatic symbiosis." This theory consists of two parts, one relating to the "existence," the other to the "form," of the germ.

Regarding the "existence" of the germ, Erikson, in order to explain the origin of the first uredinia or summer spores, admits that there is an internal infection due to the latent germ as well as an external one due to

¹See also *Agricultural Gazette*, March 1920, p. 287.

uredo or æcidiospores. Basing his conclusions on numerous field and greenhouse experiments, Eriksson considers that the germ is certainly present, at any rate until experiments have definitely proved the contrary. He puts forward, with respect to the "form" of the germ, the idea, suggested to him by anatomical study, that the fungus, before assuming mycelial form, can exist in a state of latent symbiosis with the protoplasm of the host-plant. For the double organism resulting from this association he suggests the name of "mycoplasm."

Without giving absolute importance to the theory, but presenting it rather as a hypothesis, Eriksson expressed the hope that the progress of microchemical methods might in time separate the mycoplasm into its two organisms which are distinct from the morphological point of view.

But this hypothesis, which has analogies with other, relatively little different, examples of plant symbiosis (which are doubted by some workers), has been attacked by Marshall Ward, who argued from experimental evidence against the fundamental points of the theory.

Without belittling the extensive infection and culture experiments carried out by Marshall Ward, as well as the histological studies he made in order to find the origin of the secondary pustules and to clear up the biology of the rust of the *Bromus* spp., it is certain that the results he obtained do not impair the mycoplasm theory in an absolute sense.

From the comparative histological study of healthy leaves and leaves infected with uredospores, Marshall Ward deduced arguments according to which the interpretation given by Eriksson to his microscopic preparations was mistaken, while the mycoplasm theory, which he judged untenable, as well as the "internal germ" theory should be rejected.

It should be noted, however, that examination of organs, not in the first, but in the second stage of infection, shows that the infection is obviously of secondary origin, therefore decidedly different from that produced by an internal germ. It is thus absurd to admit the existence of latent germs in the case of artificial infection produced by uredo—or æcidiospores whose pustules appear in 8 or 10 days, while it is equally absurd to try to explain the origin of primary pustules with the same means suggested for secondary pustules and, using the histological examination of the latter as a basis, to condemn a theory that depends solely on the examination of the former.

Marshall Ward's deductions are in absolute contrast with Eriksson's explicit statement that the mycelia, of necessity, differ according to their origin and that the difference of the incubation periods that follow on infection with different forms of spores of one and the same species of fungus tends to show

that the nature of the mycelia cannot be the same in the different stages, which shows the need for a more detailed examination of mycelia of different origins.

This opinion is given as follows:—"The incubation period, which varies with the origin of the infection, suggests that the essential nature and mode of development of the mycelia cannot always be the same but that they depend on the origin of the infection, to which little attention has so far been paid." This statement shows phytopathologists the true path to follow.

Thus, in the hope that later researches will throw light on the biology of the rusts, it may be asked what rules can be deduced from one or the other mode of behaviour of such parasites.

In agricultural practice it is not indifferent whether healthy seed or seeds containing the latent germ of the infection are put in the ground. In the first case, if infection shows itself, it can only be from external causes, i.e., by means of spores from the same or another species of plant-host. In the second case, even if the possibility of external infection is not totally excluded, the internal infection is due to the latent germs that the plant contains in its seed or stolon.

In the latter case, the selection of the seeds and the use of varieties of known resistance would help to limit the damage caused by rust. In the other case, the harm could be checked to a certain degree by destroying the host-plants of the æcidium in the case of heteroic rusts, but nothing could be done in the case of autoic rusts.

Resistance to rusts is also a question of adaptation. Experience has so far shown that imported wheats are more subject to the disease than local ones.

Prof. Giglioli, who grew different varieties of wheat for twenty years in the experiment field of Suessola, near Acerra, in Campania, has noted that wheats from the north are usually more subject to the disease than those from the south. Soft wheats are also more subject than hard wheats.

Prof. Jovino states that hard wheat from a maritime climate does not adequately show its resistance to rust when grown under a continental climate; this is why local wheats that are more resistant to drought often surpass them. This is what occurs with the variety "Vincetutti" which in the Tavoliere was surpassed by local varieties, while on the Ionic coast it gives good yields.

Among the most important of recent works on rust, that of Stakman, Piemeisel and Levine, of the Agricultural Experiment Station of Minnesota, is worthy of special mention. These authors state that their conclusions do not uphold those of previous investigators, according to which the pathogenic action of biological forms is modified

by the action of the host-plants. The biological forms of the rusts are apparently strictly analogous to "pure strains." They may fluctuate, but always tend to return to the normal forms. It is therefore possible, though it is not yet proved, that certain biological forms may be mixtures from which pure strains, such as *P. graminis* f. sp. *Avenae* can be isolated. Biological forms may be due to mutation or gradual evolution; but these workers could not find any mutation, neither could they produce experimentally any modification in their evolution. The part played by hybridization, therefore, requires investigating.

From the practical point of view, the constancy of biological forms is of special importance, because, by crossing rust-resistant varieties, very sure results may be obtained if the rust cannot promptly adapt itself to new varieties.

Different host-plants had to be used in order to isolate mixed biological forms before beginning experiments, with transitory host-plants—called "bridge species"—which are capable, when attacked by one form of a parasite, of making it apt to pass to other hosts on which, normally, it would not live.

Experimental attempts were made to increase the virulence of biological forms against resistant host-plants by means of successively infecting them with *P. graminis* f. sp. *Tritici*, *P. graminis* f. sp. *Avenae*, *P. graminis* f. sp. *Phlei-pratensis* and *P. graminis* f. sp. *Agrostis*. The results showed that the rusts do not become gradually adapted to hosts that are resistant and in some way related. In addition, they showed that the barberry, considered as a necessary host and as capable of reinforcing the parasitic power of the other stages, neither widens the sphere of the biological forms, nor strengthens the rusts.

Biological specialization is apparently the same in the æcidial stage as in the uredospore stage.

Many species (*Elymus*, *Agropyron*, *Bromus*, barley) were used as transitory host-plants that were equally subject to *P. graminis* f. sp. *Secalis* and *P. graminis* f. sp. *Tritici*, in order to attempt to change the parasitism of the two forms.

P. graminis f. sp. *Secalis*, which does not attack wheat, but attacks barley at once, was cultivated on the former and other (theoretically) intermediary hosts for three successive years, during which over 2,000 plants were inoculated. The rust, however, acquired no fresh parasitism power as a consequence of its association with barley. *P. graminis* f. sp. *Tritici* attacks wheat strongly, rye feebly and barley easily. The parasitism of *P. graminis* f. sp. *Avenae* is also unchanged by intermediary hosts.

The serious damage caused to cereals by rusts explains why attempts are being made

to obtain resistant varieties, seeing that there are no preventive or curative remedies.

Among indirect remedies mention may be made of dressings of superphosphates, which assist the growth of the reproductive organs (ears and panicles) while attenuating that of the vegetative organs (especially the leaves). Nitrogenous manures produce the opposite effect.

Early varieties of cereals do not always give good results, compared with late varieties, as, for example, southern wheats compared with northern ones.

The rusts have other, indirect means of propagation in wild grasses (*Brachypodium pinnatum*, *Bromus mollis*, *Agropyron*, etc.) which act as host-plants for certain rusts. From the prophylactic point of view, therefore, they should be carefully destroyed, so as to avoid the hibernation of the mycelium and spores or their passing on to healthy plants.

INJURIOUS INSECTS

Response of the Eggs of Aphis Avenae and A. Pomi to Various Sprays.—PETERSON, A., in *Journal of Economic Entomology*, Vol. 12, No. 5, pp. 363-384. Concord, N.H., October 1919.

The author draws conclusions which relate to the structure, behaviour, and response of the eggs of *A. avenae* and *A. pomi*, and probably *A. sorbi* to environmental factors and various sprays, based on his studies for a period of three years.

The eggs are not only most susceptible to evaporating factors when many of the eggs are splitting their outer shells, but they are most easily killed by various contact sprays applied at this time. Experiments with a large number of contact sprays at their recommended winter strength show conclusively that concentrated liquid lime-sulphur (1:9) is the most efficient. The lower efficiency of recommended winter strengths of dry lime-sulphur and substitutes is probably in part due to the lower sulphur content of each. The insoluble character of dry lime-sulphur is also important in accounting for its inefficiency.

Nicotine added to any spray increases its efficiency in killing the eggs of *A. avenae* and *A. pomi*. This was particularly true where nicotine (1:500) is added to the recommended dormant strengths of concentrated liquid lime-sulphur, dry lime-sulphur, and substitutes ('B.T.S.' and 'Soluble Sulphur').

Sodium sulphocarbonate (1:9 or 1:14) kills a large percentage of eggs, and is worthy of further investigation. Various sprays made with hydrated lime, strong fish-oil soap solutions, miscible oil ('Scalecide'), 1:15 to 1:40 crude carbolic acid, cresols, linseed and cottonseed oil emulsions, etc., only kill a small percentage of eggs during December

January, and February and the early part of March. Some of these sprays kill 80 to 95 per cent of the eggs if applied when the fruit buds first show green (March 21, 1919).

The New Jersey Agricultural Experiment Station is recommending a delayed dormant spray of concentrated liquid lime-sulphur (1:9), combined with nicotine (blackleaf 40), 1:500. This spray should be applied when the fruit bud is swollen and first shows green. Applications made after the leaves are out 0.5 in. or more will burn the foliage of most varieties.

Reports of investigations by the author have been previously noted.

797.—Life-History Observations on Four Recently Described Parasites of *Bruchophagus Funebris*, in the United States—URBAHNS, T. D., in the *Journal of Agricultural Research*, Vol. XVI, No. 6, pp. 165-173. Washington, February 10, 1919.

Information is given on the biology of the four following Chalcididae, "known to be parasites of *Bruchophagus funebris* Haw. This insect develops from the egg to the adult in seed of *Medicago sativa*, *Trifolium pratense*, and various species of wild *Medicago*:"

(1) *Liodontomerus perplexus* Gahan, reared from *B. funebris* infesting seeds of *M. sativa* and *M. hispida nigra* in Arizona, California, South Dakota, and Iowa. This species lives parasitically on the larva of *B. funebris* and, in exceptional cases, also on the pupa. It appears to be of considerable economic importance by reducing the damage done to alfalfa seed by *B. funebris* in all the seed-producing districts of Western Arizona.

(2) *L. secundus* Gahan, a parasite of the larva of *B. funebris* infesting seed of *T. pratense* in Idaho, Oregon, and South Dakota.

(3) *Eutelus bruchophagi* Gahan, parasitic on larva of *B. funebris* living in *M. sativa* seed in Utah, Idaho, and California.

(4) *Trimeromicrus maculatus* Gahan, parasitic on larva of *B. funebris* in seed of *M. sativa* in Arizona, California, New Mexico, Kansas, South Dakota, and Utah. This species is apparently well established in the Yuma Valley, Arizona, where it has been observed to destroy approximately 7% of the larvae of *B. funebris* infesting alfalfa seed. It also appears to be well established in Honey Lake Valley, North-Eastern California.

AGRICULTURAL STATISTICS

CROPS OF 1919-20 IN THE SOUTHERN HEMISPHERE

Countries	Area			Production		
	1919-20	1918-19	Average 1913-14 to 1917-18	1919-20	1918-19	Average 1913-14 1917-18
	Acres	Acre	Acres	Bushels	Bushels	Bushels
Wheat—						
Argentina.....	14,957,000	16,976,000	16,420,000	214,142,000	171,593,000	149,333,000
Uruguay.....	721,000	840,000	880,000	5,734,000	6,890,000	7,560,000
South Africa.....		953,000	795,000	6,630,000	8,983,000	6,597,000
Australia.....	7,413,000	8,649,000	10,546,000	44,001,000	75,232,000	114,893,000
New Zealand.....	192,000	208,000	282,000	4,005,000	6,568,000	6,171,000
Totals.....				274,512,000	269,266,000	284,554,000
Barley—						
Argentina.....	615,000		447,000	10,279,000		5,444,000
Uruguay.....	5,000	5,000	8,000	73,000	73,000	107,000
South Africa.....		125,000	84,000	1,160,000	1,723,000	1,373,000
Oats—						
Argentina.....	2,301,000	2,980,000	2,849,000	53,754,000	31,776,000	52,464,000
Uruguay.....	85,000	85,000	116,000	1,626,000	1,213,000	2,012,000
South Africa.....		641,000	434,000	7,077,000	8,960,000	8,075,000
New Zealand.....	410,000	173,000	239,000		7,897,000	10,132,000
Corn—						
Argentina.....	8,184,000		9,651,000	258,688,000		195,791,000
Uruguay.....	495,000	552,000	679,000		2,784,000	6,574,000
South Africa.....		3,952,000	2,889,000	36,923,000	41,290,000	37,552,000
Flaxseed—						
Argentina.....	3,512,000	3,419,000	3,818,000	42,039,000	30,776,000	28,158,000
Uruguay.....	68,000	51,000	69,000	689,000	498,000	480,000

FOREIGN CROP CONDITIONS

(From Broomhall's Corn Trade News.)

United Kingdom.—At the end of May the weather was quite favourable for the cereal crops. Spring crops germinated well and were progressing favourably.

France.—At the beginning of June the earing of cereals was taking place under favourable conditions, and harvest prospects were generally maintained. Crops everywhere were promising.

Sweden.—Fine weather prevailed during the latter part of May and the outlook for spring crops had improved.

Spain.—The crop situation in May was generally favourable, but a decrease of 400,000 in the wheat acreage was confirmed.

Italy.—Crop conditions were still favourable in the latter part of May, but a heat wave was causing fears of serious crop damage.

Germany.—The weather was reported favourable in the latter part of May and prospects pointed to a good harvest. Potatoes were planted in good time. The German Agriculture Council has announced the initiation of an agricultural programme with the object of increasing the production of food.

Hungary.—The weather was extremely favourable for the crops during May, but a short outturn of wheat is expected on account of the reduced acreage.

Roumania.—According to an official statement nearly all the land in the new and old territories has been cultivated.

Czecho-Slovakia.—The text of the April report was not very favourable, but the condition figures for wheat showed the crop rather over average, and rye about average, except in Silesia, where it is under average.

Poland.—On May 1, the condition of the wheat crop was average, but the rye crop bad. Favourable weather conditions were prevailing.

North Africa.—Much crop damage from drought is reported, and Algeria will not have sufficient wheat for home consumption.

India.—Crop conditions were generally favourable in May.

Australia.—Severe drought prevailed during May and is likely to have an unfavourable influence on the whole season, particularly in New South Wales where re-sowing was necessary, and seed scarce.

Argentina.—Favourable weather for the new crops prevailed in May. The acreage of the new wheat crop is thought to exceed all previous records.

UNITED STATES JUNE CROP REPORT

The United States Department of Agriculture makes the following estimates from the reports of correspondents and agents

of the crops on June 1. The acreage harvested and the production for 1919 are given for comparison:

Crops	Area		Production	
	1920	1919	1920	1919
	Acres	Acres	Bushels	Bushels
Winter wheat.....	34,165,000	49,905,000	504,000,000	731,636,000
Spring wheat.....	19,487,000	23,338,000	277,000,000	209,351,000
All wheat.....	53,652,000	73,243,000	781,000,000	940,987,000
Oats.....	41,032,000	42,400,000	1,315,000,000	1,248,310,000
Barley.....	7,467,000	7,420,000	185,000,000	165,719,000
Rye.....	5,470,000	7,063,000	80,000,000	88,478,000
Hay.....	71,752,000	72,034,000	Tons 112,000,000	Tons 108,666,000

THE 1920 CROPS OF CANADA

Crop	1920	1919
	Acres	Acres
Wheat.....	16,921,000	19,126,000
Rye.....	730,000	753,000
Barley.....	2,575,000	2,646,000
Oats.....	15,291,000	14,952,000
Potatoes.....	803,000	819,000

THE SUGAR-PRODUCING SEASON 1919-20

YIELD OF RAW SUGAR FROM THE BEGINNING OF THE SEASON, (SEPTEMBER 1).

Countries	1919-20	1918-19	Per cent (1918-19=100)
	Pounds	Pounds	
Beet Sugar—			
Germany ¹	1,536,628,000	2,868,515,000	53.6
Belgium ²	318,521,000	157,607,000	202.1
Denmark ³	313,053,000	286,598,000	109.2
France ²	322,665,000	232,188,000	139.0
Netherlands ³	502,649,000	363,098,000	138.4
Switzerland ²	19,467,000	25,331,000	76.8
United States ⁴	1,527,696,000	1,521,900,000	100.4
Cane Sugar ⁴ —			
Argentina.....	573,196,000	277,669,000	206.4
Queensland ⁶	347,180,000	425,554,000	81.6
Spain.....	13,338,000	14,594,000	91.4
United States—			
Louisiana and Texas.....	233,423,000	568,787,000	41.0
Hawaii.....	1,200,603,000	1,153,380,000	104.1
Guatemala.....	29,630,000	50,287,000	58.9
India.....	6,722,156,000	5,308,743,000	126.6
Mauritius.....	518,081,000	557,257,000	93.0

¹Yield to end of January. ²Yield to end of March. ³Yield up to end of February. ⁴Total yield of season.⁵Of which the production represents, on the average, 91 per cent of the total for Australia.

LIVE STOCK STATISTICS

SWITZERLAND

Classification	Number on		Increase (+) or decrease(—)	
	24 April, 1919	19 April, 1918	In number	Percentages (1918=100)
Horses.....	122,084	128,971	— 4,887	— 3.8
Mules.....	3,262	3,092	+ 170	+ 5.5
Asses.....	959	1,072	— 113	— 10.5
Cattle.....	1,443,170	1,530,522	— 97,353	— 6.4
Swine.....	465,306	365,798	+ 99,508	+ 27.2
Sheep.....	265,413	229,649	+ 35,764	+ 15.6
Goats.....	350,485	356,455	— 5,970	— 1.7

CZECHO-SLOVAKIA

Classification	Bohemia, Moravia, Silesia		Slovakia	
	31 May, 1919	1910	31 July, 1919	1911
Horses.....	325,111	423,162	166,155	296,256
Cattle.....	2,359,431	3,288,291	969,461	1,151,469
Swine.....	819,345	1,790,746	600,111	701,513
Sheep.....	170,432	188,863	546,337	446,026
Goats.....	849,677	649,615	95,259	29,033

DENMARK

The number of swine in Denmark on January 10, 1920 was 917,836, compared

with 583,366 on February 10, 1919, 513,012 on February 5, 1918, and 2,496,706 on July 15, 1914.

UNION OF SOUTH AFRICA

Classification	Number		Increase (+) or decrease (-)		
	1919	1918	In number	Percentages (1918=100)	
Horses.....	695,138	677,884	+	17,254	+ 2.5
Mules.....	81,150	82,769	-	1,619	- 2.0
Asses.....	498,616	473,587	+	25,029	+ 5.3
Cattle.....	5,575,488	5,171,654	+	403,834	+ 7.8
Sheep.....	28,491,500	26,897,754	+	1,593,746	+ 5.9
Goats.....	5,842,270	5,273,879	+	568,391	+10.8
Swine.....	724,007	660,565	+	63,442	+ 9.6
Ostriches.....	282,070	314,265			

WOOL INDUSTRY OF ARGENTINA

The following article, which has been translated from *La Prensa*, published in Buenos Aires, gives a comprehensive review of the wool industry of Argentina:

Twenty-five years ago, when the second national census was taken there were in Argentina 74,000,000 sheep, this number decreasing to 67,000,000 in 1908 and to 43,000,000 in 1914. From 1914 until today the stock of sheep has not appreciably changed.

This decrease in sheep has caused a proportionate decrease in the production of wool. These conditions, however, have been compensated for in part by the quality of the sheep and their better utilization.

The actual production, consumption, and exportation of raw wool from 1913 to 1918 in the district north of the 42nd parallel were as follows:

Raw wool in Argentina, north of the 42nd parallel, 1913-1918

(Quantities in metric tons of 2,204.6 pounds).

Year	Consumption	Exports	Production	Average price
1913.....	4,800	131,000	135,000	\$377 00
1914.....	4,700	125,000	129,700	401 00
1915.....	5,000	137,000	142,000	472 00
1916.....	5,700	141,000	146,700	546 00
1917.....	6,500	161,000	175,000	795 00
1918.....	7,500	125,000	132,500	974 00

These official figures do not include the movement of wool in the ports south of the 42nd parallel of latitude, these ports having been free up to 1917, except when such exportations took place through transshipments in some of the ports north of the 42nd parallel. Estimated from the stock of sheep in Tierra del Fuego, Santa Cruz, and Chubut, and the average of the yield per head, the probable direct exportation is the difference between the production of those territories and the exportation of transshipments in ports north of the 42nd parallel.

Thus, in the years 1913-1919, these figures reached the following for raw wool, in metric tons:

Exports of raw wool by Argentina, south of the 42nd parallel, 1913-1918

(Quantities in metric tons of 2,204.6 pounds).

Year	Exported by transshipment	Exported direct	Total
1913.....	8,400	11,300	19,700
1914.....	11,100	8,500	19,600
1915.....	2,000	19,000	21,000
1916.....	4,500	17,000	21,500
1917.....	2,100	17,900	20,000
Average.....	5,620	14,740	20,360

In 1916 the exportation of washed wool began to assume some importance, amounting in that year to 3,902 tons, to 8,089 tons in 1917, and to 12,512 tons in 1918.

The following table contains the figures of consumption in the country and of exportation in the last five years and the total of wool washed, in metric tons:

Argentine Washed Wool

Quantities in metric tons of 2,204.6 pounds).

Year	Consumption	Exports	Total
1913.....	2,900		2,900
1914.....	2,300		2,800
1915.....	3,000		3,000
1916.....	3,400	3,902	7,302
1917.....	3,900	8,089	11,989
1918.....	4,500	12,512	17,012
Average.....	3,400	8,167	7,500

The destination of the exports of washed wool in 1918 and the respective quantities exported are as follows, in metric tons: United States, 8,291; Italy, 1,581; Spain, 885; France, 439; Brazil, 255; all others, 1,150; total, 12,511.

There are at present operating in this republic 14 wool-washing establishments, which washed in 1918 the 9,920,811 pounds of wool used in the country and the 27,584,266 pounds exported, or a total of 37,505,077 pounds. This represents some 61,729,430 pounds of raw wool or 20 per cent of the production of wool.

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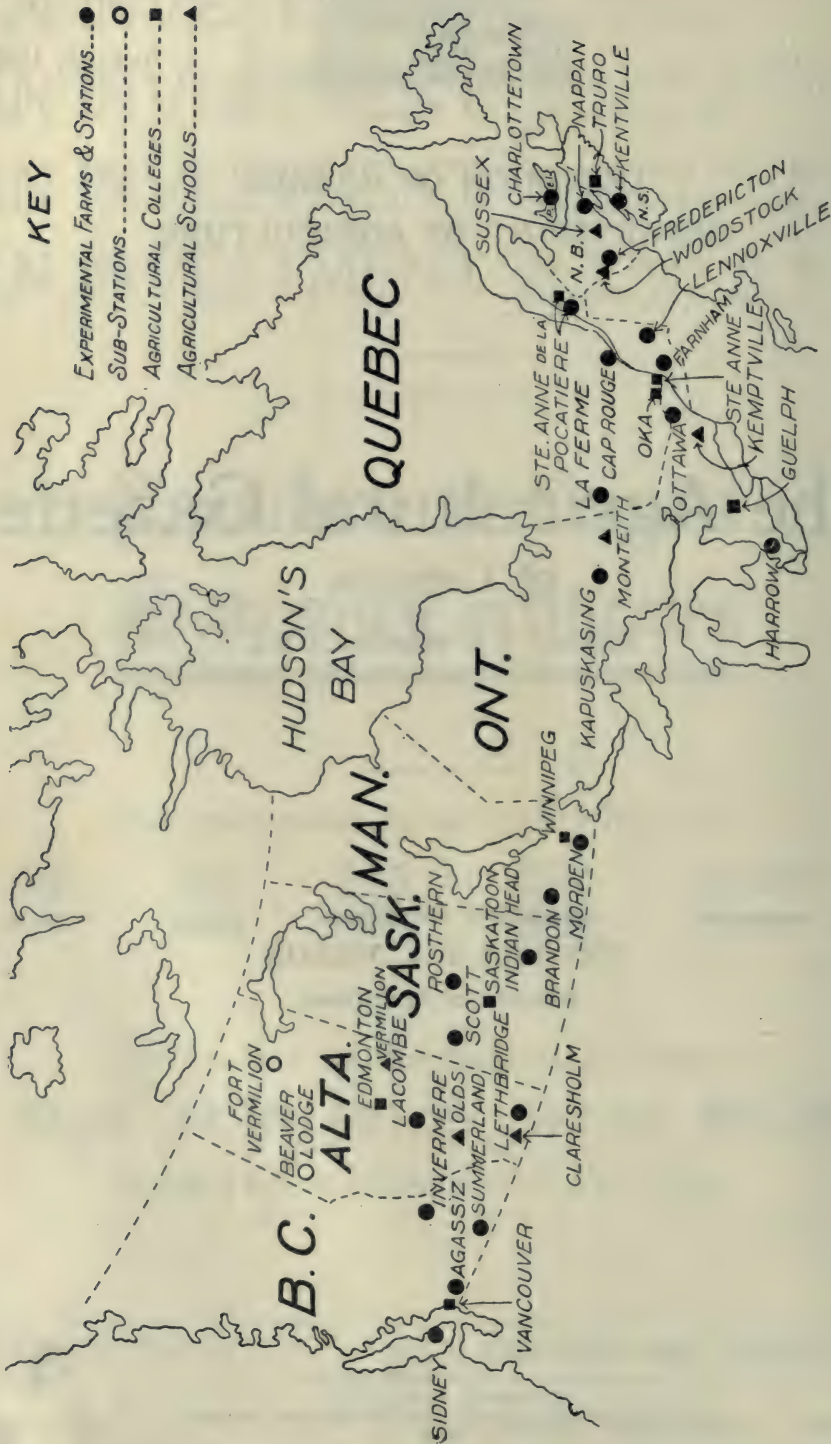
DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE

The Agricultural Gazette of Canada

EDITOR: J. B. SPENCER, B.S.A.

Issued by direction of
THE HON. S. F. TOLMIE
Minister of Agriculture

OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920



MAP OF CANADA SHOWING THE LOCATIONS OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

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THE LIVE STOCK SITUATION

BY H. S. ARKELL, M.A., B.S.A., LIVE STOCK COMMISSIONER

AN analysis of the world live stock situation reveals the fact that the North American Continent is rapidly receding from the advantageous position which it held during the war as a source of supply for European markets. Our geographical position favoured our trade to such an extent during the war period that we were able to obtain outlet at high prices for all food material that could be produced. The rapid return, however, to normal transportation conditions is resulting in the world reverting to the pre-war basis of trade, particularly in the case of frozen meats, including beef, mutton and lamb. The situation as regards present sources of supply is well indicated in the following table:—

Imports of Fresh Meat and Bacon by Great Britain for Five Months, 1920.

	Beef cwts.	Mutton cwts.	Pork cwts.	Bacon cwts.
United States.....	93,551		67,605	1,774,565
Uruguay.....	209,674	10,626		
Argentina.....	2,434,009	292,549		
Australia.....	347,978	1,357,277		
New Zealand.....	204,945	1,357,305		
Other Countries.....	180,273	51,157	65,979	32,167
Canada.....				454,592
Denmark.....				143,480
Netherlands.....		41	70	
Total.....	3,470,430	3,068,955	133,654	2,404,804
Total in 1919.....	3,069,042	1,261,158	38,006	3,722,439

By way of further comment upon the same situation, it may be noted that the importation of frozen beef for May into Great Britain amounted to 846,287 cwts., of which Argentina contributed 63%; Uruguay 10%; New Zealand 10%; Australia 9%; U.S.A. 4% and other countries 4%.

As regards supply of mutton and lamb, Australia and New Zealand are now contributing practically 90% of the total purchases. It is worthy

of note also that, in connection with bacon arrivals for May, United States contribution was reduced by 100,000 cwts. and the supply for Denmark was increased by a similar amount. It is interesting to observe that France, which, prior to the war, purchased but a very small quantity of frozen beef, imported during the first three months of the year 385,912 quarters of beef as compared with 610,410 by Great Britain.

Reviewing the feed situation which has such an important bearing as regards the outlook for live stock production, it is clear that, statistically speaking, the world is in a much better condition than was the case a year ago. The effect of this condition, particularly in view of the crop prospects in North America, is likely to be felt to the greatest extent in connection with the production of hogs and dairy produce. Denmark is still unable to import even a fair proportion of her normal requirements in feed, with the result that bacon production is being restricted within much narrower limits than was the case before the war. Great Britain will, therefore, be obliged to continue to turn to North America for large supplies of bacon and the opportunity offered to Canada in this direction continues to be very bright indeed. While the high prices of all feeds have prevented the further development of this trade by the Dominion, it is believed that an easier feed situation should make possible considerable increased production this year. Canadian bacon still retains its favour as compared with American on the British market, which fact is likely to have a powerful effect in enabling Canada to maintain her position as a source of bacon supply.

While general business conditions indicate that prices are likely to work down to lower levels, the fact remains that Canada has now a marketing organization which is able to secure

for producers of live stock the maximum price which is offered for the same quantity of product on the world market. This fact is well illustrated in that Canadian live stock prices for a considerable period have ruled highest not only on the North American Continent but, as well, in comparison with practically all other countries of supply. Canadian hog prices during the whole period of the war demonstrated the truth of this statement but the prices for beef cattle, sheep and lambs are almost equally worthy of note. On the one hand, the packers have formed export connections and developed export trading experience during the war period, which represents a real asset to Canada in connection with the continuance of her trade. Again, through the operations of co-operative organizations in connection with the handling of live stock, wool, eggs and dairy products; through the service which is being given to stockmen in the sale of their stock by the supervision, undertaken by the government, of public stock yards; through the Markets Intelligence Service which provides accurate, dependable and current markets information daily, as regards prices, movement and disposition of stock marketed at the public stock yards as well as relating to the sale of wool, eggs and poultry, the producers of live stock are now enabled to effect their sales through a marketing channel which fully safeguards their interests and makes possible a confidence as regards the returns they receive such as has never before been achieved. One may unhesitatingly affirm that Canada possesses now one of the most effective marketing organizations in the world.

Under these conditions, the producer of live stock should be able to face the future with considerable confidence. A strong and growing local market is absorbing a large proportion of his product. The world outlet

offers him satisfactory opportunities in competition with other countries. What is now needed perhaps more than anything else is quality in the product, and volume of supply. The organization of our marketing machinery has been one great task which Canada has already achieved. It remains now for her to organize her production as effectively both from the standpoint of the individual

farmer and as regards the output from each community in the Dominion. It will be a reflection on the business ability of our Canadian people if we are unable, during the next two or three years, to organize our production on a thoroughly commercial basis so that we may be able to meet, on an equal footing, the competition of any other country in the world.

HOME BRANCH OF SOLDIER SETTLEMENT.

THE Soldier Settlement Board is interested not only in the success of the returned man on his farm, but in the work of his wife in the home. For this reason a Home Branch was established which is doing most important work. Many of the settlers' wives have recently arrived in Canada from the Old Land; many of them are living for the first time on a farm and are meeting with all the problems incidental to the new conditions of living. To these the Home Branch brings encouragement and friendly assistance.

In each district the work of the branch is planned, according to the needs of that district, by technically trained, experienced directors assisted by as many trained home counsellors as are required.

For the carrying on of this work the Home Branch has gained the hearty co-operation of such organizations as the Red Cross, Canadian Patriotic Society, Women's Institutes G.W.V.A., etc.

Through its efforts small hospitals or Red Cross Outposts have been established in the outlying or newly

settled areas in order that competent medical and nursing help may be available.

Free courses of instruction in Home Economics and farm subjects, such as Poultry, Dairying, etc., are provided by the Board with the co-operation of Provincial Departments and many organizations, including extension departments of the universities, Red Cross, etc. Already eight short courses have been held and approximately 300 women have taken advantage of the instruction offered. The students have appreciated, not only the knowledge gained, but the entertainment provided and the pleasant companionship and friendship of others interested in the same kind of work.

Booklets dealing with household subjects, child welfare and farm activities, are sent, free of charge, to any who wish information along these lines.

These are but a few features of the work of the Home Branch which has done much to arouse a greater interest in the home and to develop a better Canadian citizenship.

PART I

Dominion Department of Agriculture

DOMINION AGRICULTURAL LEGISLATION

DURING the recent session of the Dominion Parliament agriculture received commanding attention and several measures of great importance were adopted, one of the principal of these, namely, an Act to Regulate the Sale Inspection of Commercial Feeding Stuffs, Bran, Shorts, Middlings and Chop Feeds is reviewed and summarized in an article in Part I of this number of THE AGRICULTURAL GAZETTE, by Mr. John R. Dymond of the Seed Branch. Other Bills adopted were to amend the Canada Grain Act, to amend the Animal Contagious Diseases Act, to amend the Oleomargarine Act, to amend the Inspection and Sale Act, to amend the Soldier Settlement Act, 1919, respecting Maple Products and respecting Honey.

THE CANADA GRAIN ACT

The Act to amend "The Canada Grain Act" repeals the 9th and 10th paragraphs of Section 107 of the Bill passed in 1912, respecting No. 1 wheat inspected as "No grade", and substituting the following:—Grain inspected as "No grade" for moisture and dried may be graded as dried of the grade to which it belongs or as straight grade, in the discretion of the inspector. Section one hundred and fifty-seven of the Act was amended by providing for the issue of cash purchase ticket or certified cheque on receipt of storage receipt, and subsection 4 of section 160 of said Act, was repealed and further provision

made for courses of procedure in case of failure to redeem cash purchase ticket. If the paying agent of such warehouseman within twenty-four hours after demand by the holder neglects or refuses to redeem the cash purchase ticket, the holder may demand in exchange a warehouse storage receipt.

ANIMAL CONTAGIOUS DISEASES ACT

The Act to amend the "Animal Contagious Diseases Act" repeals section 46 of the said Act and substitutes the section providing that every person violating any provision of the Act, or of any regulation made by the Governor-in-Council or by the Minister shall be liable to a penalty not exceeding \$500 and not less than \$50.

THE OLEOMARGARINE ACT

The Act to amend "The Oleomargarine Act, 1919," provides that any person violating a regulation shall be subject to a penalty of not less than \$50; and repeals section 9 of the said Act and provides that any person who manufactures oleomargarine contrary to the provisions of the Act, shall be liable on summary conviction to a penalty of not less than 25c. for each pound and not more than 50c. for each pound of oleomargarine so manufactured or offered for sale. In no case is the penalty to be less than \$50.

FRUIT PACKAGES

The Act to amend the "Inspection and Sale Act" provides that all apple barrels manufactured in Canada and all barrels containing apples packed in Canada for sale, shall contain as nearly as practicable 7,056 cubic inches. All apple boxes are to contain as nearly as practicable 2,174 cubic inches. If apples are packed in boxes or barrels having trays or fillers, the provisions of this Act do not apply. All apple crates manufactured in Canada or containing apples packed in Canada for sale, must contain as nearly as practicable 2,174 cubic inches. All peach boxes manufactured in Canada or containing peaches packed in Canada must contain either 725 cubic inches, 828 cubic inches, or 932 cubic inches. All plum or prune boxes must contain 725 cubic inches. Cherry boxes must contain 1,386 cubic inches. All four-basket fruit crates must contain 1,054 cubic inches. All berry or currant boxes must contain four-fifths of a quart, one pint, or two-fifths of a quart. All fruit baskets must contain one bushel, eleven quarts, six quarts, or three quarts. The Minister of Agriculture is given authority to make regulations prescribing the quality, form and dimensions of all containers in which fruit is packed, and materials of which such containers can be made; to prescribe the kinds of fruit which shall be subject to the regulations deemed by him to be necessary to secure efficient operation and enforcement of the regulations; and to prescribe penalties not exceeding \$50 or one month imprisonment for violation of the regulations.

SOLDIERS' LAND SETTLEMENT

The Act to amend "The Soldier Settlement Act, 1919", provides that

the word "settler" shall mean male member only of certain military forces. The chairman of the Board is to have the same rights or privileges as to transportation enjoyed by a deputy head of a department. Settlers obtaining advances must furnish additional securities if previous securities are found insufficient. Other provisions are made for repayment on sales of seed grain and feed or for advances for taxes and insurance. Terms of payment on sales of stock and equipment for improved farms can be varied on the option of the board. No officer, agent or employee can purchase, acquire or sell land which the board is authorized to deal with, or take any commission or act as agent. No person may destroy or obliterate marks or brands placed by authority of the board under penalty of prosecution. The board can require insurance of property in favour of the board to cover the settlers' indebtedness. If the settlers fail to pay any lawful rates, taxes or assessments, or for insurance, the board may pay the same and add the sum so paid out with interest to the purchase price at the rate of seven per cent per annum, and make it repayable at the discretion of the board. In this connection it can be stated that up to the 19th of June 17,872 settlers' loans amounting to \$70,555,434 has been approved.

The Act respecting "Maple Products" and the Act respecting "Honey" were re-enactments of clauses previously in force under the Adulteration Act.

APPROPRIATIONS

The following appropriations were made for agriculture for 1920-21 compared with the same for 1919-20:—

	1920-21.	1919-20.
Experimental Farms—Maintenance of Central Farm and establishment and maintaining of additional branch stations.....	\$ 1,215,000	\$1,200,000
Branch of Entomology.....	18,000	18,000
For the administration and enforcement of the Destructive Insect and Pest Act.....	170,000	149,200
For the development of the dairying industry, and the improvement of transportation, sale and trade in food and other products.....	165,000	155,000
Towards the encouragement of cold storage warehouses for the better preservation and handling of perishable food products..	25,000	25,000
Fruit Branch.....	140,000	122,500
Health of Animals.....	500,000	465,000
For the administration and enforcement of the Meat and Canned Foods Act.....	520,000	442,000
Publications Branch.....	35,000	36,300
International Institute of Agriculture, to assist in maintenance thereof and to provide for representation thereat.....	10,000	10,000
For the development of the Live Stock Industry.....	975,000	800,000
To provide for assistance in transportation of live stock, hay, and haying outfits in the drouth areas of the western provinces....	350,000	.....
To enforce the Seed Act, to test seed for farmers and seed merchants, to encourage the production and use of superior seeds and to encourage the production of farm and garden crops.....	225 000	200,000
For the administration and carrying out of the provisions of the Agricultural Instruction Act.....	15,000	25,000
Grant to National Dairy Council.....	3,000	.....
	\$ 4,366,000	\$ 3,648,000

EXPERIMENTAL FARMS

PROMOTIONS

Mr. F. H. Reed has been promoted from assistant to the Superintendent of the Experimental Farm at Brandon, Man., to Superintendent of the Experimental Station at Lacombe, Alta.

Mr. M. P. Pike has been promoted from Demonstrator of Orchard Spraying, to assistant to the Superintendent of the Experimental Station at Kentville, N.S.

THE ENTOMOLOGICAL BRANCH
FOREST INSECT CONTROL WORK IN BRITISH COLUMBIA

THE PINE BARK-BEETLE OUTBREAKS

BY J. M. SWAINE, CHIEF, DIVISION OF FOREST INSECTS

THE yellow pine and lodgepole pine stands of southern British Columbia have been subjected to very heavy losses during the last twelve years through extensive outbreaks of two destructive pine

bark-beetles, the Western Pine Bark-beetle, *Dendroctonus brevicomis* Lec., and the Mountain Pine Bark-beetle, *Dendroctonus monticolae* Hopk. These small, dark-coloured beetles appear early in July, in immense

numbers, from the bark of trees which they have killed during the preceding summer and attack weakened and healthy pines. In British Columbia the former species affects yellow pine only, while the latter attacks with almost equal readiness yellow pine, western white pine and lodge-pole pine. The beetles bore into the bark of the trunk and excavate tunnels, along the sides of which their eggs are laid, either in the inner bark or between the bark and the sapwood. As many as 2,000 pairs of these beetles have been found entering the trunk of a single yellow pine in British Columbia. The young or grubs which hatch from the eggs also excavate numerous galleries in the same location, so that the inner bark is girdled rapidly in thousands of places and the sap flow effectively checked. The infested trees turn yellow during fall, winter, or early spring and the foliage becomes dead and red by the end of June. The trees are then known as "red-tops," and during July the young beetles leave them finally to attack the healthy pines in the neighbourhood.

THE FACTORS FAVOURING THE DEVELOPMENT OF OUTBREAKS

These beetles are native to our western forests and are always to be found in some numbers throughout the distribution of their host trees. The great destructive outbreaks of recent years have developed through the operation of conditions specially favourable to the rapid development of the beetles, such as the provision of abundant food, through large quantities of neglected slash from lumbering operations or cuttings of any kind, dying and weakened trees left by ground fires, and large bodies of wind-blown or snow-broken timber.

THE AREAS AFFECTED BY THE INFESTATION

The injury caused by these pine bark-beetles has already been very

great and the infestations have been spreading steadily and rapidly. Practically all the yellow pine region of British Columbia is affected more or less seriously and in some of the most heavily timbered valleys the destruction has been almost as thorough as a forest fire. The most extensive outbreaks are west of Okanagan Lake in the Okanagan and Similkameen districts. The white pine of British Columbia has been almost entirely killed and these beetles have apparently been the chief destructive agent. The lodge-pole pine is attacked in very many places, and extensive outbreaks occur in the Okanagan and Similkameen and also in the Kootenays.

METHODS OF CONTROL

Although the bark-beetles are so destructive they can be controlled effectively by destroying the broods of beetles in the area infested, and thereby checking the spread of the outbreak. This control work can be effected by modified logging operations and often without great expense since in many valleys the trees which are cut may be utilized for lumber. The winter is passed by the destructive species in either the larval or adult state within the bark of standing trees, logs or slash infested during the summer immediately preceding. Dead trees are never re-infested. The general principle to be followed in their control is, therefore, to destroy the broods during winter in approximately 75 per cent of the infested bark, selecting the most heavily infested trees so that approximately 75 per cent of the broods of beetles will be destroyed.

If the infested limit is being logged, the beetle-infested logs are treated so as to kill the broods in the bark by one of the following methods:

1. The logs are put in water in the early spring and left immersed long enough to kill the broods.

2. The infested logs are sawn during winter and the slabs burned before spring, or they are removed entirely from the neighbourhood of the limits.

If the timber cannot be logged with profit, although control of a beetle outbreak is necessary, the infested trees may be felled and the bark removed from the main trunk and burned if necessary, or the bark may be removed by barking tools from as much of the lower trunk as can be reached, making particular effort so to treat the large and heavily infested trees.

PROGRESS ON THIS SEASON'S CONTROL WORK

It was realized last season that valuable stands of yellow pine in the Coldwater valley and in several adjacent valleys near Merritt, B.C., were threatened with total destruction by the beetles, although the infestation was not at that time beyond control. The ownership of the infested timber was divided between the Dominion Forestry Branch, the British Columbia Forestry Branch, the Dominion Department of Indian Affairs and local lumber companies, and through a co-operative arrangement between these organizations and the Entomological Branch extensive control work was undertaken last winter to check the spread of bark-beetle outbreaks in the Coldwater, Voght, Indian

Meadows and Spious valleys. This control work included slightly modified logging operations in the valuable timber and direct control work in outlying sections from which the timber could not be salvaged. The former method was carried out on their own lands and on two Indian Reserves by the Nicola Valley Pine Lumber Company and the latter method by the Dominion and Provincial Forestry Branches on their respective territories. The cost of this direct control work was met by the two forestry Branches with funds which they had provided for the purpose. In order to secure the proper application of the control measures, the supervision of the control operations was undertaken by the Forest Insect Division of the Entomological Branch and Mr. Ralph Hopping, in charge of Forest Insect Investigations in British Columbia, has planned and supervised the work from its commencement last January.

The entire work has apparently been accomplished in a satisfactory manner, the crews being now engaged on the final operation of burning the logging slash.

This is the first extensive bark-beetle control work ever undertaken in British Columbia and it is hoped that it will result in definitely checking the infestation in the Coldwater-Spious area, and thereby save a very large quantity of fine timber which would otherwise have been entirely destroyed.

TWO NEW AMENDMENTS TO THE REGULATIONS UNDER THE DESTRUCTIVE INSECT AND PEST ACT

LEONARD S. MCLAIN, M.S.C., CHIEF, DIVISION FOREIGN INSECT PEST SUPPRESSION

ON account of the general shortage of fodder in the Prairie Provinces this spring, it was necessary to import large quantities of hay from the United States, and in order to prevent the importation of the alfalfa weevil (*Phytonomus posticus* psyll.) on shipments of alfalfa

hay from the weevil infested districts in the United States, the following amendment was passed by Order in Council on April 14, 1920:

Section 7, Sub-section (i)—

"Alfalfa (lucerne) hay, whether for feeding, packing, or other purposes, originating in the State of Idaho, Utah, and also in

the counties of Uintah, Sweetwater, and Lincoln in the State of Wyoming and the counties of Dennison and Gunnison in the State of Colorado; four of the United States of America. The prohibition shall not extend to shipments of alfalfa (lucerne) hay transported through the districts mentioned on a through bill of lading."

The alfalfa weevil was first found on this continent near Salt Lake City, Utah, in 1904, and since then has gradually spread over a wide area. Twenty-seven quarantines have been passed by nine states, dealing with this pest, restricting the movement of commodities, likely to harbour this pest, from infested to noninfested territory. This weevil is wide spread in its distribution and is reported from Europe, western Asia and northern Africa, although regarded as "common" in its native habitat it has not been known to ever become "very seriously injurious". Unfortunately the same statement cannot be made about its activities on this continent. The beetles spend the winter as adults and it is stated that fully 80 per cent survive the winter in Utah. The eggs are laid in the early spring and the adults and young larvæ feed on the leaves of the plants. In a badly infested field the plants rarely grow over six inches high which is too low for mowing. It is with the object of protecting the alfalfa growing districts of Canada that this quarantine was passed.

In May 1919 an embargo was passed which prohibited the importation of corn fodder, corn stalks, green sweet corn, corn on the cob or corn cobs from certain counties of the states of Massachusetts and New York which were infested by the European Corn Borer. Further investigation of the habits of this pest have shown that it may be carried from one locality to another on many other species of plants, and the chief ones are those mentioned in the following amendment which was passed on May 24, 1920, and rescinded the embargo passed last year. Furthermore the United States Federal

Horticultural Board have placed a strict quarantine on the areas now infested in Massachusetts, New Hampshire, New York, and Pennsylvania and will not permit the exportation of plant products from the infested areas unless they are accompanied by a certificate of inspection stating that the shipment is free from this pest.

By Order in Council passed on May 24, 1920, the Amendment dealing with the European Corn Borer passed on May 19, 1919, under subsection (h) of Section 7, is hereby rescinded and the following substituted therefor:

- (h) Corn and broom corn, including all parts of the stalk, celery, green beans in the pod, beets with tops, spinach, rhubarb, oat and rye straw as such or when used as pack-cut flowers or entire plants of chrysanthemums, aster, cosmos, zinnia, hollyhock, and cut flowers or entire plants of gladiolus and dahlia, except the bulbs thereof, without stems from the following towns (townships) and cities in four of the United States of America:

MASSACHUSETTS: Barnstable, Bourne, Brewster, Dennison, Eastham, Falmouth, Harwick, Orleans, Provincetown, Sandwich, Truro, Wellfleet, and Yarmouth in *Barnstable County*; Amesbury, Andover, Beverly, Boxford, Danvers, Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipswich, Lawrence, Lynn, Lynnfield, Manchester, Marblehead, Merrimack, Methuen, Middleton, Nahant, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salem, Salisbury, Saugus, Swampscott, Topsfield, Wenham, West Newbury, in *Essex County*; Arlington, Bedford, Belmont, Billerica, Burlington, Cambridge, Carlisle, Chelmsford, Concord, Dracut, Everett, Framingham, Lexington, Lincoln, Lowell, Malden, Medford, Melrose, Natick, Newton, North Reading, Reading, Summerville, Stoneham, Sudbury, Tewksbury, Tyngsboro, Wakefield, Waltham, Watertown, Wayland, Weston, Wilmington, Winchester and Woburn in *Middlesex County*; Avon, Braintree, Brookline, Cohasset, Holbrook, Milton, Quincy, Randolph, Wellesley, and Weymouth in *Norfolk County*; Abington, Brockton, Duxbury, Hanover, Hanson, Hingham, Hull, Kingston, Marshfield, Middleboro, Norwell, Plymouth, Pembroke, Rockland, and Scituate in *Plymouth County*; Boston, Chelsea, Revere, Winthrop, in *Suffolk County*;

NEW HAMPSHIRE: Kingston, Plaistow, Seabrook, in *Rockingham County*;

NEW YORK: Albany, Cohoes, Colonie, Guilderland, in *Albany County*; Johnstown, Perth, in *Fulton County*; Amsterdam, Florida, and Mohawk, in *Montgomery County*; Brunswick, North Greenbush and Troy in *Rensselaer County*; Ballston, Charlton, Clifton Park, Galway, Malta, Milton, Saratoga Springs, and Stillwater in *Saratoga County*; Glenville, Niskayuna, Princetown, Rotterdam, Schnectady in *Schnectady County*; Esperance in *Schoharie County*;

NEW YORK (Western): Dayton, Perrysburg, Persia, in *Cattaraugus County*; Hanover Pomfret, Sheridan, Dunkirk, in *Chautaugua*

County; Brant, Collins, Cheektowaga, Eden, Evans, Hamburg, and North Collins in *Erie County*;

PENNSYLVANIA: North Girard in *Erie County*;

Unless the same are accompanied by a certificate of inspection issued by the United States Department of Agriculture which states that the shipment is free from infestation by the European Corn Borer. This prohibition does not apply to the articles listed when they shall have been manufactured or processed in such a manner as to eliminate risk of carriage of the European Corn Borer, nor to cleaned shelled corn and clean seed of broom corn.

THE LIVE STOCK BRANCH

RECORD OF PERFORMANCE TEST FOR PURE BRED DAIRY CATTLE

DURING the past year, there has been a considerable increase in the number of cows entered for the Record of Performance test, and also in the number which have qualified.

The most important development has been the passing of resolutions at the annual meetings of the Ayrshire and Holstein-Friesian Associations that "a 305-day test with a 400-day

calving requirement be added to the Record of Performance and that the calving requirements in the 365-day test be eliminated."

The 305-day test should prove of great advantage to those who wish to have their cows freshen each year, and the 365-day open test will provide an opportunity for high-producing cows to make maximum records.

The following is a summary of the year's work.

	No. of cows entered for the test	No. of cows qualified	No. of cows which produced enough milk and fat to qualify, but failed to calve within fifteen months after commencement of test
Ayrshire.....	752	176	40
French-Canadian.....	30	8	1
Guernsey.....	33	.....	3
Holstein-Friesian.....	767	217	75
Jersey.....	455	96	25
Shorthorn.....	155	61	15
	2,192	558	159



A HOLSTEIN CHAMPION AND FOUR DAUGHTERS

- NO. 1.—"JEMIMA JOHANNA OF RIVERSIDE" 10254. CHAMPION BUTTER-FAT PRODUCER IN THE R. O. P. ALL BREEDS, 1919-20. RECORD 30,373 LBS. MILK; 1,024 LBS. FAT
- NO. 2.—"JOHANNA JEMIMA POSCH" 24685. SECOND HIGHEST BUTTER-FAT PRODUCER IN THE R. O. P. ALL BREEDS, 1919-20. DAUGHTER OF "JEMIMA JOHANNA OF RIVERSIDE." RECORD 26,415 LBS. MILK; 972 LBS. FAT.
- NO. 3.—"LLENROC LADY JEMIMA" 36458. DAUGHTER OF "JOHANNA JEMIMA POSCH." NOW UNDER TEST IN THE RECORD OF PERFORMANCE.
- NO. 4.—"JEMIMA JOHANNA OF LLENROC" 27350. TWIN DAUGHTER OF "JEMIMA JOHANNA OF RIVERSIDE." UNDER TEST IN THE RECORD OF PERFORMANCE.
- NO. 5.—"JEMIMA JOHANNA OF LLENROC 2ND" 27351. TWIN DAUGHTER OF "JEMIMA JOHANNA OF RIVERSIDE." UNDER TEST WITH THE RECORD OF PERFORMANCE.



AYRSHIRE COW "WHITNEY'S LASSIE," 41683, WINNER OF THE AYRSHIRE ASSOCIATION'S SILVER CUP FOR THE YEAR 1919. RECORD 16,081 LBS. MILK; 659 LBS. FAT



SHORTHORN COW "MOLLIE," 97295, WINNER OF HIGHEST RECORD R. O. P., 1919-20. RECORD 16,815 LBS. MILK; 711 LBS. FAT

Number of bulls which have qualified for registration since the inception of test by sireing four or more qualified progeny each from a different dam:—

Ayrshire.....	72
French-Canadian.....	2
Guernsey.....	1
Holstein-Friesian.....	79
Jersey.....	17
Shorthorn.....	8
	179

Following are given the names, records and owners of the highest butter-fat producing cows of each

breed since the commencement of the test.

	Name	Reg. No.	Lbs. Milk	Lbs. fat	Owner
Ayrshire.....	Lady Jane.....	30,886	19,405	786	A. S. Turner & Sons, Ryckman's Corners, Ont.
French-Canadian...	Aromaz.....	1,597	13,219	631	Director Experimental Farms, Ottawa, Ont.
Guernsey.....	Western Queen.....	834	12,132	661	Banford Bros., Chilliwick, B.C.
Holstein.....	Jemima Johanna of Riverside.....	10,254	30,373	1,024	W. C. Houck, Chippewa, Ont.
Jersey.....	Sunbeam of Edgeley	629	18,744	926	James Bagg & Son, Edgeley, Ont.
Shorthorn.....	Mollie.....	97,295	16,815	711	T. B. Macaulay, Hudson Heights, Que.

THE ENCOURAGEMENT OF THE USE OF IMPROVED SIRES

BY W. R. REEK, B.S.A., ASSISTANT COMMISSIONER.

THERE are, at present, and will be for many years, during the process of settlement of the vast areas in Western Canada and in many sections of the east, settlements that are sparsely populated and where it would be a decided advantage to arrange some form of supervision by the government in order that the quality of stock maintained will be of a superior class and therefore be profitable to the owner and suitable to be the foundation for the industry.

In order to assist sane development, the Live Stock Branch will continue to place sires in outlying and sparsely settled districts. This necessitates the formation of simple organizations, so that responsibility may be placed in a proper manner. The

sires are purchased by the Branch and loaned to the organizations under specific arrangements. The aim is to buy really good commercial bulls in order that the progeny when properly cared for, will bring top market prices. The Branch retains the right to decide when such societies actually require assistance.

There were on January 1st, 1920, 1,152 bulls, 506 rams and 89 boars in the hands of organizations.

Ownership of animals induces greater interest and stimulates activity which always takes the form of proper care. The industry is in need of an improvement in quality that can come only through private ownership of animals which are above the average. Generally farmers or any group of farmers throughout

the older sections of the East or the West are not in a condition comparable with the settler on the fringes of civilization, and consequently do not require similar assistance, but may be materially assisted in the selection or by the purchase of sires through a qualified government agency.

The Live Stock Branch is prepared to purchase on order, under the Sire Purchase Policy, for any producer who is not in so favourable a position as is the Branch to purchase to advantage.

The necessary forms can be supplied on application. All formal applications for assistance under the Sire Purchase Policy must be accompanied by a deposit; in the case of bulls, \$50; and in the case of boars or rams, \$10. Purchase will be made by competent employees of the Branch and the cost to the applicant will include only the original purchase price and the freight charges.

All animals will be delivered subject to acceptance. If for any valid reason an animal is not considered satisfactory, the Live Stock Branch must be notified within three days after delivery. Any such complaint will be dealt with promptly and, if necessary, the animal will be removed and the deposit and the freight charges paid will be refunded. Upon expiration of the three day period, in the event of no complaint having been made, the balance of the purchase price will become due. In the event of a considerable number of applications being received from any one territory, exchange stables will be provided by the Branch for the assembly of the sires with a view to executing orders more promptly and for the purpose of giving applicants an opportunity of making their own selection out of the number on hand.

Before carrying on this work in any province, special arrangements for operation will be discussed with the Provincial Departments of Agriculture.

EXHIBIT OF EGGS AND POULTRY

THE Poultry Division of the Live Stock Branch has prepared an extensive educational exhibit of eggs and poultry for display at the larger exhibitions in Canada this year. The chief purpose of the exhibit is to impress the public, more especially the consumers and handlers of eggs, with the value of careful grading. By means of transparencies, the appearance of the various recognized grades, such as "Specials," "Extras," "No. 1's," and "No. 2's," are shown. There are also displayed cases of eggs graded into the various classes. The lessons taught by these exhibits are further impressed by appropriate illustrations and legends. To enable visitors to

judge from appearance the value of eggs of the different grades, from a consumer's stand point, a continuous candling demonstration is provided. Two series of pictures have been prepared to depict correct and careless methods of handling eggs from the farm yard to the consumer's home. One of these pictures shows that eggs produced in dirty quarters, gathered infrequently, and badly taken care of before marketing and then held by the local merchants in unsavoury quarters, necessarily results in eggs unfit for food. The contrast picture shows that by proper methods of keeping the fowls and handling the eggs in cool clean quarters an appetizing product is ultimately secured.

POULTRY SELECTION IN PRINCE EDWARD ISLAND

BY C. POIRIER, DOMINION POULTRY REPRESENTATIVE

DURING the last two years, selection of flocks has been carried on at Charlottetown, P.E.I. During the summer we endeavoured to eliminate all the non-profitable hens. In the spring individual breeding pens were mated up and cockerels that had been selected in the fall previously were placed in these pens. Cockerels for the

following year were selected from these pens. We intend to carry on this work of selection and this, coupled with The Record of Performance work, I think, should give us male birds of very good quality. The chickens hatched from Record of Performance birds have been "Toe punched" and we will now keep track of those birds.

APPOINTMENT OF STOCK YARD AGENT

MR. E. G. Gordon, B.S.A., has been appointed Stock Yard agent at Toronto. Mr. Gordon is a graduate of the Agricultural College, Guelph, Ont. and since 1915 has been employed by the Ontario Department of Agriculture, to inaugurate and aid co-operative live stock shipping throughout Ontario.

Mr. Gordon brings to this position a very thorough knowledge of live

stock conditions in Ontario and has an intimate acquaintance with the Toronto Stock Yards and their methods of doing business. Mr. Gordon is pre-eminently a stock man and with his natural commercial turn, it is anticipated that he will be of inestimable service to the people of the province and Stock Yard Company and to the commission men and others on the yards.

PART II

Provincial Government Departments

THE USE OF IMPROVED SIRES

NOVA SCOTIA

BY M. CUMMING, B.S.A., LL.D., SECRETARY FOR AGRICULTURE

IN addition to our regular public propaganda, for the use of improved sires, the province of Nova Scotia has adopted a few special measures which it is hoped will result in the use of pure bred sires only, on the farms of the province.

So far as cattle are concerned a large share of the improved stock breeding is accomplished through the medium of agricultural societies of which there are 269 organized within the boundaries of the province. These societies subscribe money which is supplemented by a government grant. They are required to confine their purchases to pure bred sires, except in a few cases where it is difficult to obtain such. The work of these societies has been much hampered by the fact that scrub bulls were frequently owned within their boundaries which, to a large extent, competed against the pure bred bulls.

In order to encourage the improvement of live stock by the repression of scrub bulls "*The Scrub Bull Act 1919*" was passed. The more important clauses of this act are as follows:

No keeper of a scrub bull shall allow or permit such scrub bull to serve any cow that is owned or harboured or kept within the boundaries of any agricultural society, except a cow owned by him as hereinafter provided.

When a scrub bull is within the boundaries of any agricultural society, the keeper of such scrub bull shall keep the same in some place so fenced or otherwise enclosed that the passage of such bull therefrom will in

any event be prevented whilst such scrub bull is unaccompanied by or not under the control of a competent attendant.

Where it is made to appear to the president or secretary of an agricultural society that it is impracticable for a person owning a cow within the boundaries of such society to procure the services of a pure-bred bull, such president or secretary may issue a permit in writing authorizing the keeper of a scrub bull to serve said cow. In the case of the refusal or neglect to issue such permit, the superintendent of agricultural societies may, if he thinks proper, issue the same.

In 1920 the scope of this act was enlarged so that it now applies to Live Stock Improvement Associations organized by the Dominion Department of Agriculture.

Already there are evidences that this Act has accomplished considerable to drive out the scrub sire, and to establish the supremacy of the pure bred sire.

In respect to stallions "*The Horse Improvement Act*" of the province of Nova Scotia requires that all owners of stallions must have their stallions enrolled, and must, in all bills and advertising circulars, have them advertised as either "pure bred" "grade" or "scrub". There is nothing in the Act to prevent owners from travelling scrub sires, but the fact that they have to be advertised as scrubs has so far injured the pride of the owners that a substantial number have been put out of commission.

Conditions are somewhat peculiar in a province like Nova Scotia where the same consideration is not given

agriculture as it receives in some of the central and western provinces. Knowing this we have to move a little more carefully. None the less, it is planned, as soon as ever horse-breeding begins to thrive again, to amend the *Horse Enrollment Act* with a view to finally permitting only pure bred stallions to stand in the province.

But after all the most permanent medium for establishing the supremacy of the pure-bred sire is demonstration of his merits and educational propaganda. This we are endeavouring to accomplish through the provincial Agricultural College, the Dominion Experiment Stations, The live stock breeders, and all the means of demonstrating and promoting an educational propaganda which are within our reach.

NEW BRUNSWICK

BETTER SIRES

BY E. P. BRADT, B.S.A., SECRETARY FOR AGRICULTURE

THE revised regulations governing the granting of bonuses on bulls purchased by agricultural societies specifies that the animals shall be graded and placed in one of three classes, XXX or XX or X, the last class being rejected in so far as the granting of a bonus is concerned. The bonused animals shall be kept for the use of the members of that society only. The society agrees to buy only bulls of the same breed and use them in that locality for a period of ten years. They also make all arrangements for caring for the animals. All animals must be tuberculin tested, and preference is given to those from dams having satisfactory Performance Records.

The society obtaining assistance under the regulations shall report to the department the cost of the animals, accompanied by a receipted account signed by the breeder from whom the purchase was made. Assistance will not be given to more than two breeds in any one society, and no society shall receive bonuses on more than five bulls in any one year. In the event of the society wishing to dispose of an animal the provincial Department of Agriculture shall be given a thirty days' option to purchase.

A sliding scale system in the payment of bonuses has been adopted. Its object is to encourage societies to buy better bulls. In the past an initial bonus of 20 per cent, followed by an annual bonus of 10 per cent for each year that the animal was kept and passed inspection, was paid. Now, however, a bonus of 20 per cent of the purchase price for animals grading XXX is paid, together with an additional yearly bonus of 10 per cent, while the XX animals are given an initial bonus of 10 per cent and a yearly bonus of 5 per cent of the cost of the animal. Bulls grading X receive no bonus.

It will be determined at the annual inspection whether the individual animals will be raised or lowered in grade or will remain as originally placed. It is possible that a bull originally graded XX may by proper feeding and care develop into a XXX animal, and thus be entitled to the same bonus as a XXX bull. Also a bull originally placed in the XXX class might by lack of feed and care revert to a XX bull and thus receive only the second or third bonus given to the XX animals, or it might be rejected as is the case with an animal grading X. The revised regulations shall be considered in force from September 1st, 1920.

An endeavour has been made to raise the standard of bonused bulls by tightening up on the inspection. There is still a vast difference between the best animals purchased by some societies and those who may just

slip past the inspection without being turned down. The new scale of payments will be an inducement to societies to reach out for higher quality animals so that they may benefit by the full bonus.

NEW BRUNSWICK

BY F. W. WALSH, ACTING SUPERINTENDENT, LIVE STOCK DIVISION

THE Live Stock Division of the New Brunswick Department of Agriculture has placed special emphasis on the use of improved sires in its efforts to effect an improvement of various classes of stock. Following are the methods principally employed:

Horses: Stallion Enrolment.

Cattle: (a) Bonus on Agricultural Society bulls.

(b) Formation of associations to take advantage of the bull loan offered by the Federal Department of Agriculture.

Sheep: (a) Supplementing the bonus given by the Federal Department of Agriculture.

(b) The grading and listing of rams.

Pigs: Distribution of stock of the Boys' Pig Clubs.

STALLION ENROLMENT

The enrolling of stallions is carried out under the provisions of the Stallion Act. The following shows the system of classification adopted:

Pure Breds

Class A, Superior; Class A Average; Class A Unsound.

Cross Breds

Class B Superior; Class B Average; Class B Unsound.

Grades

Class C Superior; Class C Average; Class C Unsound.

BONUS ON BULLS

For some years the Department has paid a bonus toward the purchase of pure-bred bulls, when bought by the Agricultural Societies, providing

these animals were purchased and kept according to the regulations set forth by the Department. The amount of this bonus is twenty per cent of the purchase price with an additional amount equal to ten per cent to be paid annually thereafter as long as the animal shall pass the inspection, and is well kept and cared for.

The total amount paid in bonuses during 1919 was \$1,993.66 on one hundred and three bulls.

Under the present bonusing regulations a graduated system is used under which bulls of merit, or XXX, receive a larger percentage amount of the purchase price, while those bulls that grade X are not eligible for the bonus.

A twenty per cent initial bonus will be given to XXX bulls with the yearly bonus of ten per cent, and to bulls of XX quality an initial bonus of ten per cent with a yearly bonus of five per cent of the purchase price.

BULL ASSOCIATIONS

Assistance was given in the formation of associations to take advantage of bull loans offered by the federal Department as set forth in Live Stock Branch Booklet, Number 4.

In 1919 thirty-five bull associations were formed under this policy, while this year a number of others have been organized. The results of this line of work have been very gratifying, for each pure-bred bull so placed displaces at least three or four scrub bulls.

BONUS ON RAMS

The Division gave publicity to the policy of the federal Sheep and Goat Division, as laid down in Pamphlet 19, whereby any flock owner owning ten or more ewes, and never having used a registered pure-bred ram, might receive an annual bonus of five dollars for two consecutive years, and agreed to supplement this bonus of ten dollars with five dollars additional; this amount to be paid in the fall of the first year after the date of purchase. That is, the buyer would receive a total bonus of fifteen dollars, of which ten dollars was payable early in January after the first year, and five dollars about twelve months later, providing the ram was used the second year.

These premiums enable a flock owner to buy a good pure-bred registered ram with practically the same outlay as would buy a scrub ram.

The bonus was given on ninety-five rams, which were used on one thousand eight hundred and ten ewes. It would be safe to say that had this policy not been in vogue a large percentage of these flocks would still be headed by a common ram.

This policy will be continued as the results are so apparent.

GRADING AND LISTING PURE-BRED RAMS

A system of grading and listing the pure-bred rams of good breeding quality was inaugurated last fall that promises to overcome the difficulties and disappointments of buyers who heretofore have bought rams without first making a personal inspection of the animals.

A competent sheep judge was engaged to grade the rams of all the pure-bred flocks in the province into three classes: viz.: superior or three star, average or two star, and common or one star, and to ear-mark them according to the grade.

The classification into grades was made on the following basis.

Three star or superior grade included rams that were true to breed type, of correct conformation and size, and having superior quality of wool for the breed. This grade included rams of the highest quality, representing the selects of each flock. These could be recommended as suitable stud sheep for pure-bred flocks.

Two star, average grade included good growthy rams of fair type, such as would be recommended to improve a grade flock.

One star, average grade, included rams that were off type, undersize, or unfit for breeding purposes.

Thirty flocks were visited and approximately one hundred and seventy-five rams graded. Of these twenty-one were classed as three star; one hundred and twenty-seven as two star and the remainder, or about fifteen per cent, as one star. The latter were not listed as being for sale.

A circular giving the breeders' name and address, also the ear-tag number, age and price, of the two and three star rams, and the qualifications of each grade, was published and distributed to sheep owners throughout the province.

As an inducement to the breeders to raise high class rams a bonus of \$3 and \$2 was offered on three star and two star rams respectively.

THE DISTRIBUTION OF BOARS

A noticeable improvement in the swine industry has been effected through our effort in establishing the Boys' Pig Clubs.

These clubs were organized with the idea of interesting the farm boys in the breeding of pure-bred swine, and to foster the plan of community breeding.

The membership of these clubs varied from six to fifteen boys, between the ages of twelve and eighteen years. Each member was supplied with a strong, healthy, pure-bred

sow, six weeks of age, and to each club a pure-bred boar of the same breed as the sows.

Some of the foundation stock for these clubs was imported and had received special care in its selection. From the offspring of this stock other clubs were supplied.

There are now twenty-six clubs the members of which own in all two hundred sows. With this number of pure-bred breeding sows in the province it is no longer necessary to import stock boars, and for the coming fall season it is safe to predict that seventy-five per cent of the pure bred boars used will have come from the Boy's Pig Clubs stock.

QUEBEC

BY OSCAR LESSARD, SECRETARY COUNCIL OF AGRICULTURE

THE use of improved sires is daily increasing in the province of Quebec, and the results obtained are most satisfactory.

Great improvement is made in the quality of herds and flocks, through the work of the Quebec Department of Agriculture, with the earnest co-operation of practical farmers. The Department helps Farmers' Clubs, Agricultural Associations and Breeders' Syndicates in the purchase of breeding animals by sending experts to choose such animals for them, and by lending the money necessary for such purchases. All such loans are payable by yearly instalments, without interest, and all agricultural associations avail themselves of this privilege.

A yearly subsidy is also granted by the Department to the Quebec Breeders' General Association, which takes an active interest in the improvement of live stock. Helped by the Department and guided by expert advice, this association purchases, through its representatives, the best animals for breeding and organizes auction sales in Montreal and Quebec, through which farmers may secure, at very easy terms, healthy pure-bred animals, possessing all desirable qualities, and the best for grading up farm live stock. These sales have been held with the approval of the Department and the co-operation of the breeders.

In addition to the encouragement given for the purchase of good breeding animals, the Department also exercises some supervision over the animals that have been purchased, and the Agricultural Representatives must visit frequently such sires as well as the herds, to report on the progress achieved, and to cause the elimination of undesirable subjects. These Representatives also help the farmers to select the most suitable sires for their herds. As to the Farmers' Clubs, a supplementary yearly subsidy of \$50 is granted to them for the maintenance of a first-class bull. Such subsidy is paid upon receipt of a report stating that the said bull is suitable, and that it has served a certain number of cows belonging to members of the club.

Last year, a rather large number of pure-bred heifers were sold at a reduced price to farmers, with prepaid transportation expenses, in order to encourage the farmers to keep females of the same breed as the males actually heading the herds of a given district. These purchasers have agreed to keep these heifers several years, and to have them served each year by a bull of the same breed, in order to improve breeding conditions and maintain the purity of the breed. The first progeny of these females belong to the Department, and they are sold at nominal prices to the

farmers of the same district, in order to increase the number of good animals of the same breed.

The Department has purchased a large number of Canadian cows, in order to practice selection and breed the best specimens. This herd is

kept on the provincial farm at Deschambault, Portneuf county.

The number of pure-bred sires kept by farmers' clubs is now over fifteen hundred. Most of these sires belong to the Ayrshire, Canadian, Holstein, and Shorthorn breeds.

ONTARIO

IMPROVED SIRES CAMPAIGN

BY J. E. RETTIE, B.S.A., ASSISTANT DIRECTOR, LIVE STOCK BRANCH

IN the campaign being carried on by the Ontario Department of Agriculture to improve the cattle stock through the use of only improved sires, the first step was to ascertain the conditions pertaining throughout the country. Through the agency of the agricultural representatives a census of the scrub bulls is being taken. The next necessary step is to solicit the co-operation of agricultural organizations in the different counties. These include, agricultural societies, farmers' clubs, cheese boards, junior farmers' organizations, and in some cases boards of trade. It is realized that if these organizations do nothing more than discuss the matter at some of their meetings and pass resolutions stating they are behind it, it will be of some assistance. The agricultural representatives are recommended not to rest content with resolutions, but if at all possible, to obtain active assistance in what may be termed personal work. The campaign includes the writing of individual letters to the owners of scrub bulls. In these letters an effort is made to convince the owners of the advantage of using improved depend-

able sires. The plans of the representatives and other officials also include personal visits to breeders and owners of scrub sires.

Local fair boards are encouraged to include competitions for grade cows and their calves sired by a pure-bred bull. The basis on which the prize is awarded is the improvement of the calf over its dam.

Good work is being accomplished by the encouragement of the organization of boys' and girls' calf clubs, with a view to obtaining instructive material for meetings and photographs of suitable animals are being collected for lantern slides. The motion picture machine is also being used to portray suitable object lessons of this character. These pictures will be available for meetings in short courses during the coming fall and winter season.

In some counties it is being discovered there is a surplus of pure-bred bulls of both the beef and dairy types. To equalize the distribution of these, sales and bull exchanges are being provided for and small breeders are being assisted to obtain the better sires they require.

SASKATCHEWAN

BY W. A. MACLEOD, EDITOR OF PUBLICATIONS

THE Department of Agriculture at Regina, through the Live Stock Branch, carries on work for the improvement of the sires of all classes of live stock, not only of stallions, but also for the elimination

of scrub bulls and grade rams that heretofore had been used in the herds and flocks of the province.

Saskatchewan was one of the pioneer provinces in passing and enforcing a law whereby the stallions

within its boundaries could be enrolled, licensed, and graded. The first Stallion Enrolment Act came into force in 1912, and since then has been enlarged and improved upon from time to time, so that now no stallion is allowed to travel in the province that has not been examined, and his examination passed upon by a body known as the Saskatchewan Stallion Board. This Board consists of the President and one other member representing the Saskatchewan Horse Breeders' Association, the Deputy Minister and the Live Stock Commissioner representing the Department of Agriculture, and the Professor of Animal Husbandry and the Professor of Veterinary Science representing the College of Agriculture. Any stallion which fails to pass in the opinion of the Board is rejected, and is not allowed to travel or stand for service in any part of the province. Stallions which are passed by the Board are graded and this grading must by law be printed on all their bills and posters, so that the owners of mares throughout the province will know what grading the stallion has received in the hands of expert examiners, and a well qualified Board.

CLASSIFICATION OF STALLIONS

Pure-bred stallions have, until the present, been placed in four categories—Class "A" "B" "C" and "Rejected", of which, of course, only the first three mentioned are allowed to stand for service. This grading has had very beneficial effect, and is appreciated by a considerable number of farmers who do not profess to be at all expert in their knowledge of suitable sires, and naturally when they see a horse in Class "A" they are more inclined to make use of him than if he is marked Class "C".

Grade stallions have not yet been entirely eliminated in the province, and grade stallions which are approved by the Board are granted a Class "D" certificate, but there is a

provision in the Horse Breeders' Act whereby any municipality in the province which desires to eliminate grade stallions may, by making application to the Board, be placed within what is known as the Pure-bred Stallion District, and no grade stallions will be allowed to travel in that municipality. The number of these Pure-bred Stallion Districts is increasing from year to year, and it is probable that within a year or so grade stallions will be excluded from travelling anywhere in Saskatchewan.

SPECIAL CLASSES

At an early meeting of the Saskatchewan Stallion Board held this spring it was finally decided to create two special classes in the grading of pure-bred stallions. There are probably a dozen or so stallions in the province of the very highest type and conformation, and that are also proved to be very prepotent sires, so a special first class known as an "AA" class will be granted to stallions which qualify as being superior even to what are usually considered first class animals. The special "AA" certificate will read as follows:—

"THIS IS TO CERTIFY that the..... stallion.....No..... having through his breeding records and his progeny demonstrated his value as a sire, and having been inspected by a stallion examiner, was found to embody such superior conformation, quality, and breed type, combined with standard weight and development for his age, as to warrant the granting of this special first-class certificate."

It was also decided to make another class between Class "A" and Class "B" which will be known as "BB", so that from now on there will be four classes of pure-bred stallions in general use in the province, and a very small and very select group of stallions which will bear an even higher grade than Class "A". The Class "A", Class "BB", and Class "B" horses are all absolutely sound, but vary, of course, in their type and conformation. Class "C" horses have no serious unsoundness, but suffer from a minor one such as a side-bone.

The grading and enrolling of stallions in Saskatchewan has been greatly aided by the strong and constant support given to the Board by the Saskatchewan Horse Breeders' Association. This Association is an important and influential body representing the horsemen of the province, and has shown its progressiveness by its support to The Horse Breeders' Act.

A MILLION HORSES

According to statistics there are now in Saskatchewan well over a million horses. In fact, a year ago there were 1,078,000. This number has been increased since then, which means that Saskatchewan holds the lead among the Provinces of Canada in the breeding of draft horses. Mr. J. G. Robertson, speaking at the annual meeting of the Horse Breeders' Association, said that probably a half million of these animals are in the heavy draft class. Another half, million, of considerably less value, are light draft and agricultural horses and the balance, or about 75,000, are small, undersized animals weighing from 700 to 1,100 pounds that are practically of no value whatever. With these facts in view the importance of constantly improving the sires used is at once evident.

In speaking of the work of the Stallion Board, Mr. Robertson stated that of 1,598 stallions examined last year 154 were definitely rejected, and 11 more rejected at the end of the breeding season, so 165 of the poorest stallions in the province are now prevented from travelling, and producing more of their inferior kind. The fact that they have been prevented from standing for service should mean much in the campaign for the breeding of better draft horses.

According to a table published sometime ago in The Agricultural Gazette, Saskatchewan possesses more enrolled pure-bred stallions than any other province in Canada, and holds the lead not only in Clydesdales,

but also in Percherons, and Belgians, the three leading breeds of draft horses in the Dominion.

IMPROVED IMPORTATIONS

The horsemen of Saskatchewan, however, are not satisfied even with the lead which they already have, but are pressing the government to assist the industry by securing the importation of superior stallions of each breed, stallions that will grade as near to the standard of excellence as possible. Various schemes have been proposed by the Horse Breeders' Association, of which the four most favored are:—

(1) The purchase of a mature stallion of each breed of outstanding quality, which could be used as a standard to represent the highest present development of the breed.

(2) If impossible to purchase such stallions a scheme has been suggested for the hire of such stallions for two or more seasons.

(3) A proposal to bonus the importation of stallions that will grade Class "A" and be approved in every way by the Saskatchewan Stallion Board.

(4) Another scheme is that a number of colts and yearlings be purchased of the very best breeding possible; and still another scheme suggested is the shipping of a number of the choicest mares of the province to be bred by the best stallions that can be secured anywhere.

As there are more Clydesdales in the province than either of the other breeds it would, of course, be reasonable that whatever scheme is adopted should be tried for the improvement of that breed first, and later on for Percherons and Belgians.

The Hon. Mr. Dunning, when Minister of Agriculture, expressed his sympathy with the idea of the Horse Breeders' Association, and suggested that the government would probably be willing to finance the purchase of a suitable stallion or stallions through the College of Agriculture on condition that its services should be made available to Saskatchewan horsemen, and his selection approved by the directors of the Horse Breeders' Association. The new Minister of Agriculture, Mr. Hamilton, has asked the directors of the Association to meet

him on June 12th, and the various proposals will then receive further consideration as to which is the most suitable for the further development of the horse industry of this province.

ELIMINATING THE SCRUB BULL

Active propaganda is constantly being carried on through the Live Stock Branch for increasing the pure-bred bulls used throughout the province, and, of course, for the reduction of the use of scrubs. This campaign is carried on largely through education, and in conjunction with the College of Agriculture, and is supported by such organizations as the Saskatchewan Cattle Breeders' Association and the Saskatchewan Stock Growers' Association. In addition to this work practical assistance is given through the Live Stock Purchase and Sale Act. This Act provides for the sale of pure-bred sires to farmers and small breeders who are just making a start, and who are not in a financial position to pay cash or to secure pure-bred bulls. The bulls are purchased for cash, and then resold on credit terms—either half credit or three-quarters credit—to the farmer who is unable otherwise to purchase a pure-bred animal. This work has now been carried on for several years, and the following table shows the development and growth from year to year:—

Year.	Pure-bred bulls distributed.
1913.....	19
1914.....	41
1915.....	84
1916.....	150
1917.....	158
1918.....	135
1919.....	195

This practical assistance is proving of very great value, and when taken in conjunction with the large sales of pure-bred bulls held not only by private breeders, but by the Saskatchewan Cattle Breeders' Association it means that pure-bred bulls are now distributed far and wide

in every corner of the province, and while much still remains to be done the steady work of the past six or seven years is now bearing excellent fruit.

As mentioned above the Cattle Breeder's Association conducts annual sales at which large numbers of pure-bred bulls are sold. These sales have been increasing from year to year. The one held in March of this year was the largest ever held in the province, and had the largest number of entries of any cattle sale held this year in Canada. Such sales furnish a splendid medium for the small breeder to dispose of his surplus bulls, and for the farmer and raiser of grade cattle to secure pure-bred bulls at reasonable cost.

IMPROVING THE FLOCKS

Similar work to that done in the elimination of scrub bulls is conducted in regard to rams. Educational propaganda is carried on for the improvement of the flocks, and pure-bred rams will be sold by the Live Stock Branch on credit terms. Large numbers of rams are purchased in this way from year to year, and the number, as is the case with bulls, is steadily increasing. Last autumn, in order to improve the blood of the pure-bred flocks, of the province, the Live Stock Commissioner, in conjunction with the Sheep Breeders' Association, purchased a car-load of imported and Eastern Canadian bred rams and ewes, quite a large proportion being either new importations from Great Britain or prize winners at the Toronto Exhibition. These rams were sold by public auction at the time of the Saskatchewan Sheep Breeders' Association sales at Regina and Saskatoon, and have since been used by the various buyers on their flocks. This will strengthen the breeding of the next lamb crop, and will in turn prove beneficial to the many grade flocks throughout the province.

On a smaller scale, but along the same lines, work is carried on for

improving the standard of the hogs in Saskatchewan. Pure bred sires of the most popular breeds will be sold to farmers on credit terms. These, as a rule, have been confined to

Yorkshire, Berkshire, Poland China, and Duroc Jersey, the Yorkshire and Berkshire being by far the most popular breeds in Saskatchewan.

ALBERTA

J. McCAIG, M.A., PUBLICITY COMMISSIONER

THERE is no special campaign on at present with respect to the use of pure-bred sires but the paramount interest of live stock in the province has always been assisted and accompanied by educational work to make the industry beneficial at as many points as possible.

In the system of special agricultural schools which is established in the province special attention is given to the breeding, care, and judging of live stock, as well as to veterinary treatment. The province is an excellent exhibition province and the displays of live stock at the larger centres are made up of good animals from the other Prairie Provinces, Ontario, and to some extent from the northern tier of States. Pure-bred bull sales are held at half a dozen points in the province each spring under government encouragement and assistance, and these are regarded as a very direct and practical means of fixing and developing the quality in pure-

bred stock. The numbers offered at these sales run from a couple of hundred to a thousand head. The same is true with respect to pure-bred sheep. Each fall pure-bred ram sales are held at half a dozen points in the province and these have tended to develop an appreciation of quality which is really the essence of improvement in live stock.

The demonstration farms are doing valuable work in improving the live stock of their districts. The proximity of the farm has a very noticeable effect in improving farm methods and in improving the quality of live stock in the neighborhoods, and the farm herds likewise furnish a good deal of livestock for distribution among the farmers of the province.

Recently for the improvement of draft horse breeding a fine Clydesdale was imported from Scotland at a cost of about ten thousand dollars. A correspondingly good one of the Percheron breed will be added.

MALE BIRDS FOR FLOCK IMPROVEMENT

NEW BRUNSWICK

BY A. C. McCULLOCH, B.S.A., SUPERINTENDENT OF POULTRY DIVISION

IN the general plan for the production and distribution of bred-to-lay strains in New Brunswick a beginning was made by the introduction of several thousand hatching eggs from the choicest of such strains in Ontario and the state of Maine. The distribution was through the medium of boys' and girls' poultry clubs organized in 1918 and 1919. In all about 475 members have been

thus started in the breeding of heavy laying stock.

In September or October each club holds a fair at which each member is expected to show all his or her chickens. On this occasion the choicest cockerel of each member's flock is leg-banded and the member given instructions to use this bird for breeding the following spring. If a member has no first class cockerels,

a good bird is selected from another member's flock and an exchange made. In so far as possible all members of each club are given eggs of the same strain, in order to minimize the danger of strains becoming mixed. We endeavour to breed the various introduced strains pure until such time as their relative value can be determined, when the poorer ones are eliminated or crossed for improvement and the more desirable ones are increased as rapidly as possible.

In a short time, it is evident, the many members cannot become successful or even interested poultry raisers. Others are extremely interested. Special attention is given the latter whose flocks this year have been the source of all the hatching eggs and day-old chicks distributed by the Poultry Division. Selection has been made from the most productive flocks. These club members or owners of breeding stations are instructed to set only the choicest eggs, and if possible from those individuals which have produced most heavily during the winter, thus improving the quality of the eggs produced as well as the number. The choicest of

the eggs which we hatch artificially are placed in pedigree trays and the chicks toe-marked. Some of these are sent to our breeding stations and cockerels from these eggs, other things being equal, will be used as breeders.

To avoid any possible trouble through injudicious inbreeding on the part of our amateur breeding station owners, even though under as careful supervision as it is possible to give, and yet to keep the various desirable strains pure, a plan is being prepared for an exchange of males from different breeding stations breeding the same strain.

Several club members and breeding station owners are installing or have installed trap-nests, and this practice will be utilized to the limit in the production of males to head breeding station flocks.

Many breeding cockerels are sold by the Department and many more by the club members and breeding station owners. A large number of hatching eggs and chicks also are distributed; the combined extent of these it is scarcely possible to calculate and equally difficult to estimate, but it is considerable.

QUEBEC

BY M. A. JULL, B.S.A., MANAGER OF POULTRY DEPARTMENT

THE Poultry Department of Macdonald College is carrying on pedigree breeding work with Barred Plymouth Rocks, S.C. Rhode Island Reds, White and Silver Laced Wyandottes, and S.C. White Leghorns. While improvement in egg production is the essential objective, at the same time, every practicable effort is made to maintain the standard qualifications in each breed.

The selection of the breeders is based on the record of performance of both males and females, with particular attention being paid to the males. The selection of female breeders is based upon the following factors: the date of laying the first egg, together with persistency in pro-

duction, especially during the late fall and early winter season; size of egg, fertility and hatchability of eggs, and livability of chicks. Male breeders are selected on the following basis: production of the mother, as well as more remote ancestors; the performance of the father, based on progeny test; the performance of the full sisters of the male himself, and his own development. At the same time, considerable importance is attached to the factors of health and constitutional vigour in the selection of both male and female breeders.

During each successive year, a larger proportion of yearling female breeders are used, especially those which not only gave good results the

first year, but also laid well in their second year. This is regarded as a very important step, and it is probable that the use of a larger proportion of yearlings, rather than pullets, even early hatched pullets, will give better results, particularly from the standpoint of the vitality of the progeny and its subsequent performance.

Male birds are also used the second year which have given satisfactory

results the first year, based on the progeny test.

Continuous selection of all the stock is practised throughout the year and a definite line of breeding work is followed with each breed, a certain amount of inbreeding being practised.

Male breeders are distributed to demonstrators in the country, the same line of male birds, as far as possible, being sent to each demonstrator from year to year.

SASKATCHEWAN

PEDIGREE POULTRY BREEDING AT THE UNIVERSITY

BY R. K. BAKER, PROFESSOR OF POULTRY HUSBANDRY

WHERE only a few birds are involved, the breeding work and the recording of progeny are fairly simple operations, the usual method being to pen together one male and one female, marking the eggs as gathered and saving them until a sufficient number have accumulated so that they may be set under a hen. Care must be taken that no other hens have access to the nest, and that, should the sitter lay an egg or two during the first days of incubation, these will be removed before hatching time.

When the chicks hatch, they may be marked either with a numbered leg band or by punching the web between the toes. At the same time, these toe-punch marks or leg-band numbers must be entered in a book of permanent record. For a very small number of individual matings, or when the work is to be carried on for only one or two seasons, this method might be fairly satisfactory, but where a large number of birds are involved, and especially when records must be kept year after year, a much more complete system is required.

The method in use at the University of Saskatchewan is not different from that at similar institutions on this continent, excepting that, as the Poultry Department here is younger

than those at most other agricultural colleges, our records do not extend through as many generations of birds and consequently we still have considerable pioneer work to do. The following is a rather brief summary of our breeding and selection processes—

1. We have endeavoured to keep the number of breeds involved as small as possible. On a commercial plant only one breed of fowls should be kept. Our work here would be much more effective and could be carried on at considerably less cost if the pedigree breeding work were limited to one breed. In our teaching work, however, we require five or six breeds, and as there is an urgent demand from all parts of the province for breeding stock of the more popular varieties, we are breeding and keeping pedigree records of from three to ten pens of each of the following breeds: Barred Plymouth Rocks, White Wyandottes, R.C. Rhode Island Reds, Buff Orpingtons and S.C. White Leghorns.

2. Work with as few individuals as possible, and be sure that each is strong and healthy and that it is reasonably true to breed, type and colour.

3. Mark each individual retained for breeding purposes, and keep

complete record and description of it. If stock is purchased, it should be marked with a numbered leg-band on which is also a letter representing the year in which the bird was hatched. The description sheet should show the breed of the individual, the source from which it was obtained and, if possible, the date of hatching. For females the sheet would be ruled to show the egg production for the year. For males beside giving a complete description of the individual, the sheet would have spaces for the numbers of the females with which he was mated.

Chicks hatched on the place, as they are being removed from the pedigree baskets in the incubator, are marked with a small leg band and are recorded in a book which shows their number and the number of the mating from which they came, or their dam's leg-band number. For this work a small riveted band is used, which is at first merely lapped around the chick's leg. When the chick is about three weeks old the band is removed from the leg; an incision is made through the web at the front of the left wing. This small band is put through the hole in the wing, is shaped as nearly round as possible and is riveted, thus becoming a permanent identification mark. As the chicks grow, the undesirable ones are weeded out. In the fall, when the pullets are ready to be placed in the laying house, a riveted leg-band is put on each. Where several breeds are involved it is a good plan to start each breed at the even hundred. For instance from one to two hundred and ninety nine might be Barred Plymouth Rocks; from three hundred to four hundred and ninety-nine White Wyandottes. These adult leg-bands, beside the serial number have the letter mentioned above. In our work, 1920 hatched stock are marked with the letter "H".

4. Trap nest all of the females, recording every egg laid to determine the value of each individual as a layer. Certain marks are used on the egg

sheet to denote abnormal or soft-shelled eggs, or to show when a hen has been broody or has gone on the nest and been let off without having laid. These marks are useful in detecting any abnormal conditions. During the breeding season, the hen's leg-band number, pen number and date are written on the small end of each egg as it is taken from the nest, an ordinary lead pencil being used for this purpose. We have tried marking eggs on the large end or on the side, but found that the chicks in hatching quite often broke the shell in such a way as to destroy these numbers. When the mark is made on the small end of the egg there is almost never any difficulty in identifying the chick by the number on the shell when it is removed from the pedigree basket.

5. The selection of females to be used as breeders is a fairly continuous process, since all of the hens, whose egg production and percentage of chicks reared are satisfactory, are retained as tested breeders. During the fall and first half of the winter particular note is made of those pullets which begin to lay early and whose rate of egg production is good. Their pedigrees are looked up, the number of days from date of hatching to first egg made note of, and if their showing on all these points is good, and if they have good size, good health, fair type and capacity, they are put in the special breeding pens.

Going through the records in this way also gives us some data on the males. When nearly all the daughters of any particular male mature quickly and begin to lay at one hundred and seventy-five to two hundred and twenty days, and their rate of egg production is good, we consider this male valuable as a breeder, and we also arrange to try out some of his sons whose sisters are giving promise of making good records, and particularly those whose dams were high layers.

6. If we have our records sufficiently worked out early in January

and if the weather is not too severe we proceed to mate up our pens, using the tested cock birds in pens of unrelated pullets and the most promising cockerels with the hens. We quite often have to mate pullets with cockerels, but in this case, we are careful not to use a cockerel with his sisters or half-sisters.

7. If weather conditions permit, all eggs of good size, shape and shell texture laid by the females in our special breeding pens, from early in February till about the tenth of May, are either incubated here or are sent out to fill orders from various parts of the province. A record is kept of all eggs placed in incubators, showing the number infertile, those tested out as dead germs, chicks dead in the shell at hatching time and chicks hatched. By the end of the season, our hatching record contains one sheet for each hen in the breeding pens, which shows the date, the number of eggs set, infertile, etc. These are totaled and the percentage fertility and percent hatch shown. This record is of considerable importance when we are selecting females to be retained as breeders for another season.

During the present breeding season more than four thousand eggs for hatching have been sent out from this Department. Chicks hatched and reared from these eggs constitute

by far the larger part of our stock distribution work, since in many instances the poultryman is able to rear enough chicks to give him a breeding pen of pedigreed stock and to have enough cockerels for the rest of his flock, and sometimes some to sell to his neighbours.

8. When the cockerels are being taken from the range here and put into winter quarters, their wing band numbers are listed. The breeding of each bird is looked up and the most promising ones are marked to be retained. Later the brothers of the best laying pullets are marked in a similar way. From these marked cockerels a sufficient number is retained for our breeding work here. All of the surplus males are offered for sale at prices ranging from four to seven dollars, depending on the breeding and quality of the individual. Several times during the fall and winter, the cockerel bunch is culled rather heavily. No bird is given the benefit of the doubt. If he is not so good that we would be willing to acknowledge him anywhere as University stock, he is not for sale alive. Each year we cull out and sell as dressed poultry a good many dozens of pure bred pedigreed males. As a result of this policy, the stock sent out has given good account of itself.

AGRICULTURAL AND VETERINARY GRADUATES

THE return to peace conditions has had the gratifying result of increasing the attendance at the agricultural colleges and schools in Canada. The classes included many men who had commenced their studies before going overseas and on returning had resumed the course. The increase in attendance is common to all of the colleges.

The Nova Scotia Agricultural College issues two grades of diplomas, the Associate Diploma and the Scholastic Associate Diploma. Only

those who make above fifty per cent in every subject and above sixty per cent in English are granted the Scholastic Diploma. In a second year class of twenty-seven, including five returned soldiers, sixteen received the Scholastic Diploma and the remaining eleven the ordinary diplomas.

At the Macdonald College fifteen students, twelve of which served overseas, were awarded the B.S.A. degree. Twenty students received the Associate Diploma. In the School of Household Science eight were successful in completing the Institution Adminis-

tration Course, while thirty-five were awarded the Homemakers' Certificate.

At the Oka Agricultural Institute eighteen students, out of nineteen which completed the four year course, secured the B.S.A. degree.

The Ontario Agricultural College graduated the largest class in its history. It includes fifty-five for the B. S. A. degree and two for the special Bachelor of Science degree. The class receiving associate diplomas was also larger than usual and included eighty-two students, which included one girl.

The Macdonald Institute, Guelph, graduated forty-four students this year. These students were in the following classes:—Normal Course in Domestic Science, 10; Housekeeper Course (non-professional), 13; Associate Course, 4; Homemaker Course, 11; Housekeepers (professional), 6.

The Manitoba Agricultural College granted the B.S.A. degree to sixteen men, while five young women won the degree of Bachelor of Home Economics. Three of the men were returned soldiers.

The College of Agriculture at the University of Alberta turned out six graduates including one returned soldier. In the course of household economics one student completed her course this year.

The attendance at the Schools of Agriculture in Alberta for the term 1919-20 was not high owing to the disorganization of work in the previous year due to the occurrence of the influenza. The number of students in attendance at Claresholm during 1919-20 was seventy (sixty boys and ten girls). Of these six men graduated in agriculture and one girl in household science and arts. At Olds there were one hundred and twenty-seven boys in attendance and forty girls. There were graduated from this school twenty-one boys and eight girls. Three of the men graduates were returned soldiers. The Vermilion school was turned over entirely to the work of teaching returned soldiers.

The graduating classes at the Ontario Veterinary College, Toronto, and the School of Comparative Medicine and Veterinary Science, Montreal, were small. At Montreal, five, and at Toronto, thirteen men were awarded veterinary surgeon diplomas. These classes included fourteen returned soldiers.

The household science schools connected with the agricultural colleges graduated about the usual number of students this year.

RECAPITULATION

College.	Graduates.
Nova Scotia Agricultural College.....	27
School of Agriculture, Ste. Anne de la Pocatiere.....	2
Macdonald College.....	15
School of Comparative Medicine and Veterinary Science, Montreal.....	5
Ontario Veterinary College.....	13
Oka Agricultural Institute.....	18
Ontario Agricultural College.....	139
Manitoba Agricultural College.....	16
Saskatchewan College of Agriculture.....	4
Alberta College of Agriculture.....	6
School of Agriculture, Claresholm.....	6
School of Agriculture, Olds.....	21
School of Household Science, Macdonald College.....	8
School of Household Science, Manitoba Agricultural College.....	5
School of Household Science, Alberta College of Agriculture.....	1

NOVA SCOTIA

RECENT AGRICULTURAL LEGISLATION

BY M. CUMMING, B.A., B.S.A., LL.D., SECRETARY FOR AGRICULTURE

THE only two Acts of specific agricultural import passed at the 1920 session of the Nova Scotia Legislature were amending former Acts.

The first was an Act amending the Act in respect to grants to Agricultural Societies, and providing for an increased grant to the society of \$5,000 per annum, making a total grant for the current year \$20,000.

The other was an amendment to what is known as the "Scrub Bull Act," according to which it is illegal to offer for public service, or to allow to run at large a "scrub bull" in any area where an agricultural society exists. The amendment makes a provision of this Act applicable to any "prohibited area" declared by the Governor in Council. The intention of the amendment is to make the Act applicable to areas where Live Stock Improvement Associations organized under the Live Stock Branch of the Dominion Department of Agriculture exist. In order that any Live Stock Improvement Association may take advantage of the provisions of this Act, such Association must have its boundaries regularly defined, and when these boundaries are approved by the Provincial Governor in Council the area will become a "prohibited area"

and be placed under the provisions of the "Scrub Bull Act."

The big feature, so far as legislation is concerned, of the 1920 session of the Nova Scotia Legislature was the New Road legislation, making provisions for borrowing money on account of road construction during the next five years of some thirteen million dollars. For a province the size of Nova Scotia, this is a very ambitious programme, but when it is carried out its value will be reflected on practically every farmer in the province.

The Agricultural estimates for 1920 are as follows:—

Salaries and expenses.....	\$ 20,500 00
Assistance to Dairying....	3,450 00
Entomological Investiga- tion.....	3,000 00
Exhibitions.....	10,700 00
Field Crop Competition..	1,000 00
Model Orchards.....	1,000 00
Printing and Advertising.	1,000 00
Miscellaneous, including bonuses on Creameries, Wheat Mills and Clover Hullers.....	5,850 00
Farmer and County Asso- ciations.....	1,450 00
Agricultural Societies....	20,000 00
Stallion Enrolment.....	500 00
Assistance to Poultry....	1,000 00
Agricultural College.....	22,000 00
College Farm.....	20,000 00
	<hr/>
	\$ 111,450 00

NEW BRUNSWICK

DEMONSTRATION WORK OF THE AGRICULTURAL REPRESENTATIVES

BY JAMES BREMNER, B.S.A., AGRICULTURAL REPRESENTATIVE FOR NORTHUMBERLAND, GLOUCESTER AND RESTIGOUCHE

EXPERIMENTAL work in this district is more or less in its infancy and a great deal of work is yet to be done along this line.

Last year the most thorough demonstrating, carried out on the same

principle as throughout other parts of the province, was in the sheep industry. Meetings were held in the spring and the subjects of co-operative marketing, the need of better sires, better care in feeding and

breeding, the care of the wool, and the need of not allowing hay or hay-seeds to fall into the wool during the winter, the advantage of co-operative over individual marketing, and various other phases that go to make up successful sheep husbandry, were discussed.

Some ten or more demonstrations were given in the shearing of sheep and the proper rolling and tying up of the wool. In two or three weeks' time demonstrations were given in the dipping of sheep. A tank was set up in a central part of the district and word sent to the various sheep owners to bring their sheep to this central point. While there were not so many sheep dipped compared with the number that are in the county, the value of dipping was clearly demonstrated. In every case the farmers claimed they had never done anything with their sheep that was of more value than the dipping which the sheep got last year for the first time.

Demonstrations were also given in docking and castrating. Many of the farmers did not dock their sheep. This can hardly be called carelessness, but lack of custom. They had not been used to doing this in the past and it is a little hard for some to break away from the old rules. Some of the best farmers, who have recently

started raising sheep, were afraid to dock their lambs for fear it might have some bad effect. In many cases these men were influenced to let us dock a few for them. This year there is no trouble in getting this permission, or in having the farmers dock their own sheep. The matter of castrating is something new in this district, but the farmers are taking to it with a deal of interest, and I hope that in the near future a large part of the male lambs will have been treated.

Some demonstration work was done last year in the spraying of potatoes for Late Blight. In one outstanding experiment conducted at Dalhousie Junction, Restigouche County, the farmer lost practically all his unsprayed crop in the field in which the demonstration was held. The plot which was sprayed had no rot whatever. The farmer estimated that he had lost at least \$500 by not spraying. At Lower Blackville, where another experiment was conducted, the spraying was not so outstanding a success, yet it was sufficient to prove to the farmer the value of spraying and he has since bought a sprayer for his own use.

One or two demonstrations were given in exercising the herd bulls by over-head wires.

LOW PRICED LIME FOR FARMERS

INVESTIGATIONAL work carried on by the New Brunswick Department of Agriculture has shown the great need of lime on the majority of the soils in the province. It is a surprising fact that tests have shown it would require from two to three tons of ground limestone to neutralize the acidity per acre of ground in the various counties of the province.

The following table shows the requirements as determined by a number of tests of representative soils in various parts of each county:

County.	No. soils tested.	Pounds limestone per acre.
Restigouche.....	3	5,150
Gloucester.....	42	5,683
Northumberland.....	30	4,085
Kent.....	20	4,681
Kings.....	44	5,690
Albert.....	10	6,690
Queens.....	8	6,262
York.....	25	6,326
Carleton.....	35	6,553
Victoria.....	29	5,876

It can be seen from this table that not less than two tons per acre should be used and better two and one-half tons when applying ground limestone.

With this information before him, the Minister of Agriculture, the Hon. J. F. Tweeddale, decided that the question of supplying cheap ground limestone to the farmers of the province was one of the important things to be considered. If lime could be placed within the reach of farmers at a reasonable price, it would mean a big increase in the crop production of the province. It would mean that the clover acreage would be increased and grown much more successfully. To the man raising potatoes, or dairy farming, or, in fact, doing any kind of farming, this would be a very practical benefit and work out in profits of dollars and cents to all using lime.

A survey of the lime deposits of the province revealed the fact that abundant supplies of high grade limestone were available, the largest deposit being in St. John County. The lime in this district is also of high quality, testing 94% carbonate of lime. It was finally decided by the Hon. Mr. Tweeddale, because of the unlimited quantities available at this point and the high quality of the material, to establish the plant at Brookville, St. John County.

FREIGHT RATES ARRANGED

Satisfactory arrangements were made by the Minister with the railways in regard to the matter of freight rates, which solved the big problem that faces the working out of a lime policy in any country, namely, that of economic transportation. It must necessarily be delivered to the farmers at a low cost to enable them to use it in the quantities required. Frequently in other provinces and States of the Union the transportation has cost more than the lime, in which cases the cost often runs up

to a prohibitive figure when it is delivered.

SUPPLIES CONTRACTED FOR

A definite contract has been entered into with Messrs. Smith & Merrithew, Limited, Brookville, St. John County, to supply ground limestone to the farmers at \$5 per ton in bulk, car lots, delivered, freight prepaid to any station on the C.P.R. or C.N.R. lines in the province, if put up in bags the cost of bags and bagging to be charged extra. They are now booking orders for summer and fall delivery. One of the most modern lime-crushing plants in America is being placed at Brookville. This plant consists of a large preliminary crusher, through which the rock is put as it comes from the quarry. The broken material then passes direct from this into a large roller-process grinder, which grinds down to the required fineness. The material can be run from this directly into the cars or into a large storage bin as required. The plant has a capacity of 80 tons per day and will be in operation early in July. A 75 h.p. electric motor supplies the power.

Farmers' organizations, agricultural societies or individual farmers may place their orders with the Smith & Merrithew Company, Brookville. Orders may also be placed with the Dept. of Agriculture, Fredericton, who will forward them to the company, the company having agreed to fill them up to the full capacity of the plant. Delivery will be started as soon as the plant begins operations. Terms will be sight draft attached to bill of lading which means cash upon the arrival of the car.

Farmers will appreciate this opportunity of getting any quantity of limestone delivered to them at as low a cost as \$5 per ton. At that price it will be widely used and the results from its use will speak for themselves.

FERTILIZING VALUE OF LIME

In conclusion, in regard to the use of lime, this might be said: Probably its most important function is in acting as a neutralizer of soil acidity thus making soil conditions more favourable for crop production. To some extent it does act as a liberator of plant food which is locked up in the soil, both potash and phosphoric acid. It is thus a very valuable indirect fertilizer. Its effect in putting the soil in the best possible condition to make the best use of fertilizers and manures is unquestioned. It also puts the soil in condition to grow clover, which is one of our best soil fertility building crops. By this means it becomes possible to add considerable humus to our soils and increase their productive capacity. Farmers thus should not look upon it as an ele-

ment that can replace entirely the fertilizer and manure which they are using, because in itself it is not a direct fertilizer. The incorporation of clover roots in soil and the sweetening of soil will, however, make it possible to reduce somewhat the amount of fertilizer used and get as good results. It will thus increase crop production at a considerable saving to the farmer. Practical tests made by farmers in different parts of the province have shown its value. Ask any farmer who has used lime on his farm and he will tell you of the marked results obtained. The farmer who maintains the fertility of his soil and its humus content, and keeps it sweet by the use of lime, will find his crops responding to such treatment and the yield per acre brought up to a high standard.

BY J. H. KING, B.S.A., AGRICULTURAL REPRESENTATIVE FOR WESTMORLAND, ALBERT AND KENT COUNTIES

AGRICULTURAL meetings were held on Saturday afternoon in Moncton during February, March, and April. This was a rather unique movement and a successful one. In all, eleven subjects were discussed, principally by members of the provincial Agricultural Department. Professor J. M. Trueman of the Nova Scotia Agricultural College, and Mr. J. K. King, Maritime Representative of the Live Stock Branch at Ottawa, also delivered two excellent addresses. Over fifty were in attendance on an average at these meetings. Saturday is the principal market day of the week in Moncton, and many farmers are in the city. Most of their business is transacted by noon.

Agricultural Short Courses of two days' duration were held in Port Elgin, Rexton, Cape Bauld, Barachois, St. Paul and St. Mary's. Though held in the latter part of March and

the first week in April, when the road and weather conditions were anything but good, these courses were on the whole well attended. At several of the meetings from 80 to 100 persons (mostly men) were present.

Sixteen sheep dipping demonstrations were conducted in one section of the province, at which the whole flocks of farmers desirous of having their sheep dipped were treated, and the neighbouring farmers invited to attend to watch the operations. Nearly 500 sheep and lambs were dipped, the results were such that dipping is becoming popular with progressive sheep farmers of this district.

In April, six live stock associations were organized after the manner outlined by the Federal Live Stock Branch, for the purpose of bringing pure bred bulls into districts composed of farmers not financially able to buy for themselves. The

provincial Department of Agriculture bonuses agricultural societies that purchase bulls that meet with the approval of the Department. In the counties of Westmorland, Albert and Kent, 43 bulls were inspected during the year.

Cow testing associations were organized in three of the principal dairy districts of Westmorland Co., and many farmers are keeping milk records and having their individual cows' milk tested for their butter fat content for the first time.

Clover seed being high in price, an effort was made to have many save their own seed last year, with the result that a great deal more was saved than ever before, and most of those fortunate enough to act on our suggestion threshed a goodly quantity of superior seed which meant the saving of many dollars to them this spring.

Two agricultural picnics were arranged and carried out in the month of July. It was planned to make them instructive and at the same time the social side was not forgotten. Talks on seasonable agricultural topics and demonstrations in sheep dipping and stock judging were given. At the same time, Miss Hazel McCain, Supervisor of Women's Institutes, addressed the ladies on women's institute work.

Demonstrations were conducted during the potato spraying period in

the potato districts, to demonstrate the value, proper mixing and thorough application of Bordeaux and to show the superior qualities of arsenate of lime over Paris green and arsenate of lead, as a poison.

This Branch co-operated with the Maritime Representative of the Live Stock Branch in giving assistance to farmers desirous of shipping lambs co-operatively to Montreal. Nine cars were sent from Westmorland and Kent counties and good results attended our efforts. Over two cents per pound more were obtained through this manner of marketing than could be obtained from local butchers, after all expenses were deducted.

In November, we co-operated with the poultry representative of the Live Stock Branch and arranged a poultry fair at Port Elgin, Westmoreland Co., where market poultry properly dressed were brought on a set day and sold direct to dealers. Nearly eight tons of poultry were disposed of so satisfactorily that it is felt that practically all the poultry will be sold in this manner next fall.

Throughout 1920, much the same work is being carried on as during 1919, but on an extended scale. Our work will be extended to a considerable extent to districts where time did not permit our going last year.

ONTARIO

RECENT AGRICULTURAL LEGISLATION

HALF a dozen measures relating to agriculture and kindred interests were passed at the recent session of the Ontario Legislature. Following is a brief outline of their provisions:

CREAM AND MILK PURCHASE ACT

This a measure designed to protect the producers of cream in the pro-

vince of Ontario in the matter of the test. It provides that all cream purchased in a wholesale way shall be purchased on a basis of the butter fat content, and that all milk which is paid for on a butter fat basis shall be tested by the Babcock method. At the present time, of course, practically all cream purchased by wholesale is purchased on a basis of its butter fat content, so

that the chief purpose is to standardize the test and see that the producer gets a fair test. The Act and Regulations prescribe the method of testing, and also provide that the shipper shall be entitled to a statement in detail of the quantities of cream received and the amount which each tested. The inspectors are given authority to enter factories at all hours and make tests, and also look over the books of the companies, and check up the quantities of cream received and the manner in which it is disposed of.

DOG TAX AND SHEEP PROTECTION AMENDMENT ACT

The dog nuisance is so general and so serious to owners of sheep that there is an effort almost every session to further strengthen the legislation to protect sheep owners from losses by dogs. The Act introduced at the recent session provides that all dogs in the province shall wear tags, to be secured from the officers of the municipality. Any dog found off the premises of its owner and not under the control of any person and not wearing a tag may be killed by any person, and there is also a fine to the extent of at least \$10 for those who fail to secure tags. This section, however, does not come into effect until April 1, 1921, so as to give people concerned proper notice.

Another amendment gives the councils of counties power to take over all dog taxes collected and to pay out the losses which may be incurred through damages to sheep. At the present time these losses are borne entirely by the townships, which also receive and control the revenue from the dog tax.

THE SALE OF FORMALDEHYDE

For some years past the Department of Agriculture and many leading farmers have been advocating the use of formaldehyde for the

treatment of seed grain for smut. Frequent complaints were heard that as formaldehyde was only handled in drug stores, it was not convenient in many rural sections where drug stores were often ten or twelve miles apart. It was found that all that was needed was a slight change in The Pharmacy Act which would put formaldehyde in the same class as Paris green and other poisons that are handled by hardware stores or general stores. It is, of course, provided that formaldehyde can only be sold in sealed packages carefully labelled "Poison" so that the handling may be properly safeguarded.

THE COMMUNITY HALLS ACT

This is a revised Bill providing that a grant of 25%, but not to exceed \$2,000 in any one case, may be made by the Government towards the erection of a community hall. Under the former Act such hall could only be vested in the township, but under the present Act it may be vested in a township or an incorporated village. It is also provided that an athletic field is not essential, as was formerly the case, if it is found that adequate accommodation for athletic purposes is otherwise provided. Furthermore, the Government is empowered to make a grant to athletic fields on the same basis as the grant towards the hall.

Another important feature added to the Act is the clause which provided that upon petition being presented to the Council signed by more than one-half the ratepayers of any school section or school sections, asking for a community hall, the council may pass a by-law for the establishment of such hall, and may assess the school section or school sections immediately concerned for the cost without assessing the balance of the township which might not be benefited by such a hall.

THE MARKETING LOAN ACT.

This is an important measure intended to grant financial assistance to organizations of producers incorporated under The Companies Act who desire to construct and operate seed centres or potato warehouses. A loan up to fifty per cent of the value of the land, building, and equipment may be made, provided that such loan does not exceed the sum of \$3,000 in any one case. This loan is free of interest for a period of two years, but fifty per cent must be repaid in five years, and the balance at the end of a further period of five years. The Act provides the usual machinery for the safeguarding of the investment. This measure is introduced in response to an indication that there is a real need in Ontario for encouraging the development of local seed centres where modern equipment for cleaning seed grain can be established, and in this way a market secured for the good seed produced in many sections. Similarly, there are indications that several sections would like to erect potato warehouses in order to carry their product for a longer period,

instead of forcing it all on the market in a short time, thereby placing the stock under control of the dealer and speculator.

BETTER PREVENTION OF DISEASES
AMONG BEES

A measure passed having for its object the prevention of the spread of diseases among bees provides for the enlargement of the scope of the Act which has been on the statute books for some time. The old Act, however, is confined to foul brood. While this is one of the most serious diseases of bees, there are other that have developed later that require the attention of the inspector. The amended Act also provides that bees or appliances from apiaries where disease has existed may be moved on certificate from the Provincial Apiarist. Formerly there was prohibition against moving bees or appliances under any condition.

APPROPRIATIONS FOR AGRICULTURE.

Following are the appropriations made for agriculture both last year and this year:

	1919	1920
	\$ cts.	\$ cts.
Civil Government, printing Reports and Bulletins, Statistics, Miscellaneous.....	145,248 46	231,442 20
Agricultural College.....	477,635 46	547,123 00
Agricultural Societies Branch.....	186,975 00	195,588 75
Live Stock Branch.....	80,750 00	88,600 00
Institutes Branch.....	49,546 50	47,276 95
Dairy Branch.....	148,050 00	162,050 00
Fruit Branch.....	88,433 54	91,039 70
Ontario Veterinary College.....	35,293 34	46,321 20
District Representatives.....	120,000 00	140,000 00
Demonstration Farm.....	8,000 00	45,098 96
	1,339,932 30	1,594,540 76
Federal Grant.....	336,303 26	336,303 26
Totals.....	1,676,235 56	1,930,844 02

RURAL CREDITS INQUIRY

THE Hon. Manning Doherty, Minister of Agriculture for Ontario, has appointed the following committee to inquire into the subject of a system of rural credits: Professor W. Jackman of the Department of Political Economy, University of Toronto; Thomas McMillan, farmer, Seaforth, and Melville S. Staples, B.A., farmer, Millbrook. In making the appointment, Mr. Doherty pointed out that conditions in Ontario differ from the conditions in the Western Provinces, where rural credit plans have been carried out. The committee will be expected to inquire into the different methods adopted both in Canada and in the United States. Having done this, it is purposed to arrange meetings with farmers in various parts of Ontario, in order to get as nearly as possible to the bottom facts of the requirements. The inquiry will include both short-term credits and long-term credits, and the committee will endeavour to work out a system

that will provide the facilities for sound agricultural development, taking into account the banking system and other financial arrangements of the province which may be affected. The committee are expected to complete their investigation by the early winter so as to give an opportunity for legislation at the next session of the Legislature.

Professor Jackman was born on an Ontario farm and was engaged in educational work in the United States for many years. He has made a study of rural credits. Mr. McMillan is a well-known farmer in Huron County and has been prominent in efforts for the improvement of agriculture and the welfare of farmers. Mr. Staples is a graduate of the University of Toronto and has taken a course in Edinburgh and on the continent of Europe, specializing in history and economics. For several years he has been farming in Durham County.

SOIL FERTILITY CONFERENCE

The second annual Soil Fertility Conference was held at the Ontario Agricultural College on June 16, 17 and 18. The gathering was primarily a meeting of fertilizer agents, manufacturers, salesmen, and visiting farmers. An educational programme was carried out in which Professor Harcourt of the Ontario Agricultural College, Mr. A. H. MacLennan, Vegetable Specialist of the Ontario Department of Agriculture, Dr. H. O. Buckman, of the Soils Technology Department of Cornell University, and Professor Blackwood of the Physics Department of the Ontario Agricultural College, were the principal speakers. Mr. Henry G. Bell, Director of the Soil and Crop Improvement Bureau, Toronto, was

chairman of the conference. Mr. Bell dealt with fertilizer theories and practice, emphasized among other things the wisdom of farmers growing their own nitrogen, which they could do more profitably than by purchasing it. The conference was favoured with the attendance of the Hon. W. Manning Doherty, Minister of Agriculture, who declared that food production is the greatest problem of the world today; that soil fertility is fundamental to food production and that he regarded it as the duty of his Department to see that the production per acre is increased in every possible way. The programme was of special interest to the very large proportion of farmers who composed the audience.

MANITOBA

RECENT AGRICULTURAL LEGISLATION

A DOZEN acts relating to agriculture and affairs that come within the province of the Provincial Department of Agriculture were passed at the recent session of the Manitoba Legislature. Eleven of these Acts were amendments to existing legislation, one only relating to the borrowing of money for seed grain purposes being new.

"The Agricultural Societies Act" was amended to permit money to be borrowed for the purposes of the Society and in order to secure repayment thereof, to hypothecate, mortgage or pledge the real or personal property of the society.

DISEASES OF ANIMALS

"The Animals' Diseases Act" was added to to provide if the owner or person in charge of any animal dying from disease does not give notification thereof, as ordered in the Act, then the carcass of the animal shall be burned or buried at the expense of the municipality within which it lies, and the mayor or reeve shall see that the provisions of this section are carried out. The municipality is given the right to recover the amount of such expense from the owner or person in charge in any court of competent jurisdiction, or may cause such expense to be held against any lands on which such owner or other person is liable for taxes.

DRAINAGE

"The Drainage Commission Act" was amended to authorize the commission to reassess lands in drainage districts so that the cost of drainage should be charged annually against each parcel of land; also to determine what portion of the cost should be borne by the respective municipalities for the making of roads, and what portion of the cost should be

borne by the province. The commission is given power to nominate and the Lieutenant-Governor-in-Council to appoint and fix the remuneration of appraisers to assist the commission in making such inquiries and determinations. The commission is required to prepare a statement showing the annual levy to be made upon the several parcels of land in each drainage district in respect to such re-assessments; and giving the respective amounts that should be paid by the various municipalities; such statement to be transmitted to the Minister of Public Works.

"The Farm Implements Act" is amended so that if any part of an implement sold as new should be discovered to be second-hand, the purchaser may return the implement and receive back any money paid, together with interest, the sale being cancelled.

PROTECTION OF BIRDS

"The Game Protection Act" is amended at some length. The amending Act extends the close season for elk or wapiti from the 10th day of December to the 1st day of December in the following year, except during the open season of the year 1920; extends the close season for prairie chicken, partridge, grouse of any variety, except ptarmigan, from the 22nd day of October to the 15th day of October of the following year, and provides that no person shall during any open season kill more than twenty-five of these birds; requires permits to be returned to the chief game guardian between November 15 and December the 15, accompanied by an affidavit that no provision of the Act has been violated; provides that muskrats north of the 53rd parallel of north latitude shall not be taken, killed or wounded be-

tween May 15th and November 1, or between November 30 and March 15 in the following year, and south of the said parallel between May 1 and March 15 in the following year. Other amendments made relate to fur-bearing animals and to commercial regulations bearing thereupon.

"The Insectivorous Birds Act" amendment repeals Section 4 and 5 of the Act as it formerly existed, and now provides that no person shall at any time kill, take or wound any insectivorous bird or any migratory non-game-birds known as grebes, loons, gulls, terns, cormorants, pelicans, bitterns and herons, or any other non-game bird whether resident or migratory, except as provided in the Act.

"The Noxious Weeds Act" is amended so that the council of any municipality may extend the appointment of weed inspectors to the 15th day of October.

LEGISLATIVE GRANTS

"The Poultry Breeders' Act" is amended to provide that any moneys appropriated by the Legislative Assembly for aid to agricultural societies shall be paid to associations at the rate of sixty per centum of the money actually paid out for prize money by an association holding a winter show; the same in no case to exceed the sum of \$1,000; the grants to be determined upon prize money as follows: First prize, \$2; second prize, \$1.50; third prize, \$1, and fourth prize 50 cents except in cases where the prize money offered is less, and then the grant is to be calculated on the percentage of the actual prize money paid.

RURAL CREDITS

"The Rural Credits Act" passed in 1917 was amended so that directors shall retire on the 31st day of January next after the date of appointment, and upon the expiry of one and two years after the said 31st day of

January, instead of in one, two, or three years, as originally provided. The limit of the amount that the province may lend to societies is extended from \$40,000 to \$60,000 to any one society. The aggregate amount that may be so loaned is extended from \$500,000 to \$3,000,000. The Lieutenant-Governor-in-Council may authorize the payment out of the consolidated revenue fund a sum sufficient to provide such fund as interim advances; provided the aggregate amount of such payment shall not in any one year exceed the amount which may be borrowed under this Act. A section is added making provision for procedure in case of default. No person can remove, sell, or permit execution on any property upon which the society making the loan had a lien or charge. Penalties are also provided in case of any false or untrue statement being made in application for the loan. Section 36 of the Act is amended so that the application for administration in case of borrowers dying, becoming insolvent or insane, may be made to a police magistrate as well as to a county judge as previously provided. Provision is made whereby the Lieutenant-Governor-in-Council, on the advice of the provincial treasurer, has power to appoint and fix remuneration of the members of a board to assist in carrying out the provisions in the Act. Such board is to be three in number, one of whom is to act as chairman, and to be known as The Commissioner of Rural Credits, the other two members being advisory.

"SEED GRAIN ACT"

The Act to enable municipalities to borrow limited amounts of money for seed grain purposes, although in itself new, is virtually a re-enactment of the Act passed last year and in previous years. It provides that municipalities may borrow such sums as required, but not to exceed \$60,000, for the purpose of furnishing grain for farmers, who served, or volun-

teered, or were called upon to serve, in the late war. After by-laws have been adopted authorizing the borrowing by the council of the municipality, debentures issued under the provision of the Act may be for any term not exceeding five years, at interest not exceeding seven per cent per annum, to be repayable in equal consecutive annual instalments. All moneys lent or borrowed under the Act are to form a fund separate and distinct from other funds of the municipality, and the clerk of the municipality is required to return to the Minister of Agriculture and Immigration a detailed statement show-

ing the disposition of the said fund. The purchase and distribution of the seed are to be made by the municipality. The provisions of the Seed Grain Act, sections 23 and 24, are to be considered as forming part of this Act. The loans may be guaranteed by the province, and any member of a municipal council can apply and receive seed grain under the provisions of the Act.

APPROPRIATIONS

The following table for purposes of comparison gives the appropriations made by the Legislature both for this and last year:

	1919-20.	1920-21.
	\$ cts.	\$ cts.
Salaries.....	13,660 00	14,800 00
Supplies and Expenses.....	1,800 00	2,500 00
Agriculture and Statistics.....	141,350 00	199,670 65
Manitoba Agricultural College.....	237,615 00	306,050 00
Immigration and Colonization.....	42,520 00	20,000 00
Agricultural Publications.....	24,700 00	23,500 00
Miscellaneous and Unforeseen.....	3,000 00	3,000 00
Birtle Demonstration Farm.....	2,920 00	3,830 00
Settler's Animal Purchase Act.....	8,960 00	9,140 00
Totals.....	476,605 00	582,490 65

Appropriations are also provided to be administered by the Department of Agriculture as follows: Game Branch, \$10,000, Marriage Licenses,

\$600, Hospital and Charity Grants, etc., \$124,409.35, Employment Service of Canada, \$64,500, the whole making a total of \$782,000.

TRAVELLING LIBRARIES

BY GEO. BATHO, ASSOCIATE EDITOR AGRICULTURAL GAZETTE FOR MANITOBA

A FEW months ago the Agricultural Extension Service of Manitoba adopted the policy of providing travelling libraries. These libraries were each made up of fifty volumes. The selection of books was unlike in the various libraries, so that a change of library would bring an entire change of reading matter. Each library was packed into a folding

case, which was planned so as to answer the double purpose of shipping box and book case.

The libraries were offered to the rural public, especially in connection with such organizations as agricultural societies, women's institutes, community clubs, and mining and lumber camps. Circulars were printed and distributed setting forth the

conditions upon which the libraries were obtainable. So far 34 such libraries have been sent out, but the number of applications for them is over the one hundred mark.

THE CONDITIONS

To receive the use of one of these libraries the community must make its appeal through some organization or group of citizens recognized as being of a representative and responsible character. The use of the library is not to be restricted to members of any organization, but is to open to all; it is to be kept in a place easily accessible, and is to be open for lending purposes at least once a week. It is not expected that the librarian is to be on salary.

The only charge imposed upon borrowers is a fee of five cents for each borrower's card, which will last a whole season. This charge, approximately, will pay carrying charges on the books.

Except in places where the demand for books would interfere, each borrower is entitled to draw two books at a time, and a book may be retained two weeks. A fine of one cent a day

may be charged for each book kept over time. Librarians are expected to collect fines to cover damages beyond the legitimate wear and tear on books. When a book goes out of condition for lending, it is to be withdrawn from the lending list.

The libraries are loaned for a period of six months. In each instance they are returned to the Extension Service in order that all necessary repairs or substitutions may be made. Upon the return of one library, the organization is at once entitled to receive another.

THE CHARACTER

In the first libraries sent out 90 per cent. of the books were fiction. It is planned to decrease this percentage in each succeeding library sent to any community, introducing more and more reading of other classes as the public becomes accustomed to library advantages.

From returns so far available, it would seem as though almost all of the books sent out in these libraries are kept constantly in circulation among readers.

SASKATCHEWAN

GREATER AVERAGE PRODUCTION COMPETITION, FOR DAIRYMEN

BY W. A. MACLEOD, EDITOR OF PUBLICATION

FOR the third year in succession, the Saskatchewan Dairy Association in conjunction with the Dairy Branch of the Saskatchewan Department of Agriculture, will again this year conduct a Greater Average Production Competition. Eight cash prizes, of the aggregate value of \$175, are offered as follows: First, \$50; second, \$40; third, \$30; fourth, \$20; fifth, \$15; sixth, \$10; seventh and eighth, \$5 each.

These are to be awarded to the owners or proprietors of herds of five or more cows on the basis of the

average butter fat production of whole herds for the twelve months ending December 31, 1920. To be eligible for a prize in this competition competitors must keep a record, for at least six months of the year, of the production of their herd in conformity with the rules laid down in the system in use by the Dairy Division, Ottawa, viz., they must weigh the milk of each individual cow three days each month for at least six months, and have each cow's milk tested for butterfat content once each month, as required by

the testing regulations. Forms for the keeping of records and full information regarding the work are supplied free of charge to dairymen in any part of the province.

P. E. Reed, dairy commissioner for Saskatchewan, believes that the regular testing of individual cows would probably prove the most

valuable feature of herd management that could be adopted. Large individual production means economical production. The object of this competition is to develop higher average production in Saskatchewan herds, which will result in greater profits through more economical production.

ALBERTA

RECENT AGRICULTURAL LEGISLATION

AT the last session of the Alberta legislature the following Acts concerning agriculture were passed:—

THE SEED GRAIN ACT, 1920.

This Act is similar to The Seed Grain Act, 1919. The amount to be advanced is not to exceed \$300 for each quarter section in any one year, nor to exceed \$850 against any quarter section including advances for seed and feed under any Seed Grain Act of previous years. The securities for advances are similar to those taken in 1919. The notes are payable October 1st, 1920. The Act is deemed to have been in force from and after February 1st, 1920. No provision is made for advances for feed in the 1920 Act, the same being dealt with in another Act.

AN ACT RESPECTING ADVANCES.

Provision is made to advance up to June 1st, 1920, feed, hay, fodder, flour, and any other commodity necessary for the sustenance of life in man or animal, and to take as security liens on chattels, or liens on land, or both, in the form prescribed. In the event of proceedings being taken for collection, The Exemptions Ordinance, The Dower Act, and any Statute of Limitation, are not to apply. Chattel liens in respect of live stock have priority over chattel mortgages, executions, and all pro-

ceedings by way of distress, whether for rent, taxes or otherwise; while land liens have precedence over all encumbrances, except taxes, first mortgages, or statutory liens held by the province.

TO SUPPLY SEED GRAIN TO SETTLERS.

A municipal district must not advance a quantity of grain of greater value than \$300 in respect of any quarter section in any year, nor so that more than \$850 shall stand as a charge at any one time for principal for seed grain against any quarter section. Feed advances under an Act repealed are to be counted as advances for seed. Where the consent of the owner to lien on the land cannot be obtained, the district can supply seed grain and take a lien on the crop and a chattel mortgage on the goods and chattels of the person so supplied. Whether or not the secretary-treasurer takes a written agreement for a lien as provided in the Act as to land against which a lien to secure an advance of seed grain was filed in 1918 or 1919, there must be a lien upon the crops grown upon the land named in the application in any year for the repayment of seed supplied during the said year, and in addition thereto there must be a lien upon the crops grown in any year from seed supplied by the municipal district for all amounts that may be due the municipal dis-

strict for advances made under the provisions of the Act in previous years. In the event of moneys advanced to resident farmers not being repaid by the 31st of December next, the council may levy a rate in the ensuing year to meet such arrears, but such levy shall not affect in any manner the remedies given the council for collection of the amounts from the borrowers.

CONSOLIDATION OF THE LAW, ETC.

This amending Act combines under the title of "The Domestic Animals Act" most of the provisions of The Fence Ordinance, The Entire Animals Ordinance, The Pound Districts Ordinance, The Stray Animals Ordinance, the Herd Ordinance, The Ordinance for the Protection of Sheep and other Animals from Dogs, The Act for restraining Dangerous and Mischievous Animals, and The Sheep Trailing Act. The whole Act comes into force in improvement districts on April 10th of this year, and the Act and Ordinances included in it are repealed as to such areas from said date. Parts, VI, VII, and VIII of the Act, comprising the provisions as to mischievous animals, as to the protection of sheep and other animals from dogs, and as to the driving or trailing of sheep, come into force in the rest of the province on said date, and the other parts on proclamation. In the meantime the other Acts and Ordinances which this Act takes the place of remain in force in all parts of the province other than improvement districts.

AMENDING THE STOCK INSPECTION ACT.

No person shall remove any stock from an abattoir or any stock yard, or kill the same, where a special stock inspector is located until such stock has been inspected by an inspector of stock and a certificate of inspection has been issued by him. Any shipper failing to furnish

to a stock inspector a correct list of brands on cattle being shipped by him shall be liable to a penalty of \$25 per head for each animal wrongfully described. The following fees are added to the tariff: For inspection at slaughter-house or abattoir, or any place where live stock is being held for feed, rest, sale, or slaughter, 10 cents per head.

AMENDMENT RESPECTING CO-OPERATIVE CREDITS.

Shareholders' notes for balance on stock need not be made payable on December 31st of the current year. Supplementary petitions certified by the secretary-treasurer may be filed and the subscribers thereon shall have the same rights and powers as original petitioners. A municipality is required to guarantee an amount equal to one-half of the stock subscribed by residents of the municipality. Applications for a line of credit made by the society to a lender and the acceptance thereof must be in writing, and a copy of such application and acceptance must be sent to the office of the Co-operative Credit Societies, Edmonton. The rate of interest payable by a borrower on a loan guaranteed by a society is not to exceed $7\frac{1}{2}$ per cent per annum, and out of the interest paid, one-half of one per cent, has to be paid to the society for the purposes mentioned in the Act, such payment to be made by the lender to the society as soon as the principal sum of the loan has been paid or renewed and all interest thereon has been paid. Upon filing a certificate against the lands of the borrower, the society has a lien and charge upon the said land for securing the payment of the loan guaranteed by the society. The registrar must register the said land lien and discharge thereof without fee. Subject to any regulation approved by the Lieutenant Governor in Council, there is to be paid to every society a grant of \$25.00 for the purpose of assisting the society in organizing.

ENCOURAGING THE RAISING OF STOCK.

Applications for loans for the purchase of stock may be made in the months of January, February, March, and April, and except with the approval of the Minister no cattle can be purchased before the 15th day of July in any year. Every association must as soon as possible, by writing, signed by a majority of its members, appoint from its members a secretary, who is to forthwith forward to the Commissioner such written appointment. It is part of the duty of the secretary to have the offspring of all cattle purchased by the association branded before they reach the age of one year, and immediately after such branding he is to report to the Commissioner the date and particulars of such branding and the number of animals branded. Branding irons may be furnished by the Commissioner to each Association through its secretary at cost, the same to be paid for by the Association. The secretary, after receipt of

instructions from the Commissioner, must vent the brand on any cattle sold, or in respect of which the notes given therefor have been fully paid. The members of any association or the secretary contravening any of the provisions of the Act become liable not only to be proceeded against in the manner provided for under Section 13 of the Act, but are also liable on summary conviction to a fine of not more than \$50.00 and costs; and, in default of payment, to imprisonment not exceeding two calendar months. The Lieutenant Governor in Council is given power to appoint inspectors, who are to act under the instructions of the Commissioner, and whose salaries and expenses are to be paid out of the general revenue fund of the province.

APPROPRIATIONS FOR AGRICULTURE

Following are details of appropriations made by the Legislature for the current and previous years:

Chargeable to Income	1919-20	1920-21
Civil Government.....	48,000 00	62,435 00
Expenditure under Agricultural Societies Ordinance, including grants to Exhibition Associations at Edmonton and Calgary.....	115,000 00	110,000 00
To provide for Expenses of Official Judges at Agricultural Exhibitions.....	8,500 00	9,000 00
To promote the work of Live Stock and Agricultural Institutes and Short Course Schools.....	10,000 00	10,000 00
To promote and encourage the production and to provide for the distribution of Seed Grain and Provincial Seed Fair..	9,000 00	12,000 00
Administration of Demonstration Farms.....	10,000 00	
Live Stock Encouragement Act.....	15,000 00	24,000 00
Destruction of Grey or Timber Wolves and Coyotes, and protection of game.....	28,000 00	25,010 00
Destruction of Noxious Weeds.....	25,000 00	25,000 00
Stock Inspection.....	30,000 00	30,000 00
To provide for expenditure in connection with Brands and Publication of Official Brand Book.....	13,500 00	14,000 00
Administration of Stallion Act.....	7,500 00	10,000 00
Collection and Compilation of Agricultural and other Statistics.	4,000 00	4,500 00
To promote and encourage Dairy Work.....	20,000 00	35,000 00
Operation of Schools of Agriculture and Demonstration Farms.	121,500 00	128,000 00
Agricultural Representatives.....	5,000 00	
Collecting and mounting specimens for Natural History Museum.....	500 00	500 00
Expenditure under Prairie Fires Ordinance (including \$1,000 for Police Service).....	2,000 00	3,000 00
Publicity Commissioner's Office.....	15,000 00	25,000 00
To promote and encourage Poultry Industry and operation of Egg Marketing Service.....	15,000 00	17,500 00

Chargeable to Income	1919-20	1920-21
Women's Institutes and Grants to same.....	12,000 00	15,000 00
Alberta's share Administration of Dominion Seed Grain Act..	5,854 47	
To provide for Free Shipment of Hay and Straw until April the 1st, 1919.....	3,500 00	
Miscellaneous grants.....	17,200 00	16,800 00
Immigration.....		10,000 00
Contingencies.....	4,200 00	4,000 00
To provide for bonuses and increases in salaries on promotion or advances in grading by Efficiency Officer.....	7,000 00	12,000 00

Chargeable to Capital.	1919-20	1920-21
Purchase and Equipment of Demonstration Farms.....	\$ 104,000 00	\$ 132,000 00
To Assist Creameries not exceeding \$1,500 to each creamery...	4,500 00	4,500 00
For encouragement and improvement of Draft Horse Breeding in Alberta.....	35,000 00	35,000 00
Hay and Relief Work.....		1,200,000 00

ESTIMATED REVENUE

Agriculture Department (\$538,100.00)—

Fees: Game Licences, Sale of Estray Animals and other Fees.....	43,000 00	91,000 00
Repayment, Account of Seed Grain.....	5,000 00	10,000 00
Repayment, Loans to Creameries.....	1,000 00	1,000 00
Repayment, Account Destruction of Noxious Weeds.....	1,000 00	1,000 00
Demonstration Farms.....	45,000 00	45,500 00
Poultry Breeding Plant.....	3,500 00	3,600 00
Registration of Threshing Machine.....	3,000 00	3,000 00
Brands.....	26,000 00	30,000 00
Stock Inspections.....	32,000 00	30,000 00
Live Stock Encouragement Act.....	5,000 00	5,000 00
Enrolment and Inspection of Stallion.....	7,500 00	7,500 00
Dominion Government, Grant <i>re</i> Greater Production Movement.....	9,000 00	
Drought Relief.....		300,000 00
Dairy Act.....		10,000 00
Casual Revenue.....	500 00	500 00

EDUCATION

Agricultural Teaching.....	500 00
Agricultural Grants to High Schools and Public Schools.....	1,000 00

DAIRY AND POULTRY INDUSTRY

To provide for Advance Payments and General Operating expenses in connection with Creamery Work.....	600,000 00
To provide for Advance Payments in connection with Poultry Marketing Industry.....	150,000 00

ALBERTA

ASSISTANT PROFESSOR OF FIELD HUSBANDRY

MR. James R. Fryer, M.A., has been appointed Assistant Professor in the Department of Field Husbandry, University of Alberta, and will be in charge of Cereal Crop Investigation. Mr. Fryer was born in Norfolk County, Ontario, in 1884.

After the usual course in the Collegiate Institute, Brantford, Ont., he obtained second-class teacher's standing, 1906; was granted second-class teacher's certificate for Ontario at the conclusion of Model School course at Hamilton, December, 1906; graduated from Toronto University with the degree of Bachelor of Arts with Specialist's standing in Biology, June, 1913; after non-resident course involving a research problem, he received the degree of Master of Arts from Toronto University, 1915. During the fourth year of University course he acted as demonstrator in general zoology to first year students for about three months; held position as Assistant Seed Analyst in the Dominion Seed Laboratory at Ottawa, 1913 to 1915, and has been Seed Analyst in charge of the Seed Laboratory at Calgary, 1915 to 1920.

In 1915, 1916 and 1917 it was his duty to inspect field root and garden seed crops in British Columbia, on account of which subventions were paid by the Dominion Department of Agriculture. This required two visits annually to each grower, once during the growing season and again after the seeds had been prepared for marketing.

In addition to this, Mr. Fryer has been conducting some very important investigations relating to seeds. For the past two years he has given special attention to the investigation of the effects of frost on the vitality and other features of Western grains. This investigation has been under way at the University as well during the past two years, and Mr. Fryer will embody these two lines of work as part of his research work in the University.

Last summer in pursuing his investigations he spent the summer quarter under the direction of Dr. Crocker, Associate Professor of Plant Physiology, University of Chicago. In addition he took courses in Plant Physiology and Micro-chemistry.

PART III

Junior Agriculture

DEMONSTRATIONS, COMPETITIONS, AND CLASS-ROOM STUDIES IN RURAL
LIFE FOR BOYS AND GIRLS

AGRICULTURAL INSTRUCTION FOR RURAL AND CITY SCHOOLS

NOVA SCOTIA

BY L. A. DEWOLFE, M.S.C., DIRECTOR, TRURO, N.S.

IN Nova Scotia we make no distinction between rural and town schools in the teaching of elementary agriculture.

I find rural and town children equally ignorant of the "*why*" in nearly all agricultural operations. The country boy knows *how* to do a number of things his town friend cannot do. He is not, however, more interested than the town boy. The country boy has had to do the drudgery so long that his interest has been killed. There is nothing in it for him. He is taught to work, but not to work intelligently. He is not given the incentive that accompanies a chance to make money. As some one has pointed out, his calf grows up to be his father's cow.

The town boy on the other hand is on the lookout for the pennies. He can sell papers, deliver parcels, run errands. To him, a garden is an increased opportunity to make money. Therefore, he wants to learn how to make that garden productive. The novelty of gardening and everything else connected with agriculture appeals to the town boy. Therefore,

he will attack the work with a vim and will carry it through.

It is the custom for town residents to improve their premises and make their grounds attractive with flowers and shrubs. The town boy sees his father or his father's neighbour playing at farming in the small back-yard garden. This is not drudgery to the city man and, therefore, does not appear as such to the city child.

In the country, on the other hand, it is the exception to see attractive well-kept gardens. The big work of the field is all the child sees. He sees a tired father and a lazy hired man. Everything is done through necessity rather than for pleasure. Such work, therefore, does not appeal to him. He knows too much about the unattractive side, and is not willing to look for another side. He needs as much training as does his town cousin. What is good for one is good for the other. The teacher of elementary agriculture must overcome the habitual idleness of the town boy and the acquired distaste of the country boy. After that, the two can progress on common ground.

NEW BRUNSWICK

A. C. GORHAM, M.S.A., DIRECTOR ELEMENTARY AGRICULTURAL EDUCATION.

THE answer to the question "should elementary agricultural instruction for city schools differ from that given in rural districts" might to my mind be given briefly in the following paragraph.

As far as nature study is concerned, if the proper methods be adopted in city schools, the subject matter of any lesson on nature or elementary agriculture must of necessity differ in a large measure from that of such a lesson given in the rural schools.

To give instruction the nature study method makes use of every animate and inanimate thing in the environment. It is impossible for a large percentage of the pupils in thickly populated industrial centres to have gardens of any kind at home. They do not have the same opportunity to study things agricultural as the rural pupil.

On the other hand, I do not think it fair to assume that the interests of the city child are confined to things strictly urban or restricted to one or two small divisions of agriculture. If facilities could be provided for the study of the soil, farm crops, poultry or any other branch of agriculture, I see no reason why they should not be studied in the city as well as in the country. Of course the teacher must use his judgment in selecting and presenting his subject, seeking to

create an interest and foster a sympathy for a basic industry such as agriculture.

The opinion is held by some that agricultural instruction is unnecessary in rural schools, it being held that the pupils receive at home sufficient agricultural instruction, and that nature study and agriculture as taught in the schools would be of more interest to the city pupils.

This I think would depend largely on the kind of instruction given. I am inclined to believe that if there were sufficient statistics we would find that there was a greater interest or enthusiasm in the lower grades of city schools than in those of strictly rural schools. Whether this interest be merely born of curiosity or whether it be deeper rooted I am not prepared even to conjecture.

QUEBEC

BY HON. CYRILLE F. DELAGE, L.L.D., SUPERINTENDENT OF PUBLIC INSTRUCTION

A NEW curriculum is to be adopted for the elementary primary schools. It will include six years with, in addition, a preparatory year. The teaching of agriculture is made very elaborate for the rural schools. It includes lectures on plants, live stock, poultry, soils, agriculture, forestry, vegetable garden, fruit garden, farm chemistry.

As regards the principles of agriculture for the city schools, they are included in reading exercises or object lessons, and relate specially to nature at various seasons, plants (trees, flowers, etc.), birds, live stock, vegetable garden, etc. The new course of studies lays great stress on the work of the school garden as a real outdoor laboratory.

ONTARIO

BY J. B. DANDENO, PH.D., INSPECTOR OF ELEMENTARY AGRICULTURAL CLASSES

IN Ontario, at the present time, instruction in agriculture is being given in all kinds of schools below college grade, whether primary or secondary, rural or urban, graded or ungraded. In these schools one distinction is made and that is a distinction between primary schools and secondary schools, the former including public and separate schools which carry on classes in forms I to IV,

or, what is called in American schools grades one to eight; the latter including classes in high schools up to matriculation into a university.

As agriculture is, relatively, a new subject on the course of study in either of these two types of school, there can be no very marked distinction between that made use of in the primary school as compared with that in the high school. Both courses are

necessarily elementary. But, because of the difference in age, mental training and experience between the classes in the primary school and those of the secondary school, the course of study of the latter is more advanced. That is practically the only difference.

CHARACTER OF THE INSTRUCTION

This leads up to the idea mainly involved in the topic under discussion,—that is as to whether two courses of study should be provided, one for rural pupils and one for city pupils.

As agricultural education in Ontario is not vocational, and not intended to be, one course of study for all pupils is meeting our needs excellently at the present time. The mental make up, or human machinery, of the country boy is not different from that of his city cousin. Fundamentally they are the same, though the individuals differ in experience and environment. Recognizing this, the Department of Education in Ontario prescribes a course of study broad enough to permit, not only of an adaptation of topics to both rural and city conditions, but also extended enough to permit of topics suitable to the needs of the classes in city, town or country. This idea was recognized especially in preparing the course of study, because even the kinds of agriculture carried on in the different parts of the province differ considerably. In one county the

main agricultural interest is fruit-growing, in another corn-growing, in another dairying, in still another mixed farming. The course of study can be adapted to all by a modification or selection.

RESPONSIBILITY OF THE TEACHER

It might be thought wise by those who advocate a centralization of authority, and a consequent bureaucratic organization, for the Department of Education to prescribe one course of study for the city and another for the country. In Ontario, this is emphatically not the method adopted and for various reasons, chief of which is that in order to have the subject taught rationally, the teacher must lead, the teacher must take the initiative. She is expected to select her own material and use her own judgment in adapting the topics to her own needs and to the experiences of her pupils. The teacher is expected to work out her own problems in her own way without interference from the Department of Education, but with all the assistance it can give. From this one can easily infer that the kind of agriculture generally made use of in the city will be the topics relating to horticulture, and those in the country will depend, to a certain extent, upon the kind of farming peculiar to the locality—all carried on under one course of study.

BY J. H. PUTMAN, INSPECTOR OF SCHOOLS, OTTAWA

THE Regulations of the Ontario Department of Education are not planned to encourage horticulture as part of the curriculum of a city school. The Regulations make no distinction between rural and urban schools and approach the problem wholly from the standpoint of agriculture. It is a perfectly natural and legitimate thing to ask country boys and girls to study

thoroughly the various breeds of milch cows, how to care for them, and how to test the milk for butter fat. The city child has a very real interest in the cow as the foster mother of the human race, but he cares nothing about the various breeds nor about the best method of producing milk. The whole problem is unreal to him because it lies outside of his experience. The best

city teacher with such a subject can do no more than stimulate an artificial interest which leads to no permanent result.

But nearly all city children have a genuine interest in everything that grows if they can themselves have some share, even a minor one, in that growth. This means that the city child must have his interest in plant growth centred around a garden

and his interest in animal life centred around song birds, hens, pigeons, rabbits, and puppies. It would be much better for the Department of Education frankly to admit that urban and rural schools, in some subjects, and especially in plant and animal study, require different courses of study, different regulations, and a different basis for the distribution of government grants.

SASKATCHEWAN

BY AUGUSTUS H. BALL, M.A., LL.B., DEPUTY MINISTER OF EDUCATION

IN Saskatchewan about seventy-five per cent of the total school enrolment is found in the village and rural schools. In addition, all the town schools contain a large rural element while our cities are not yet sufficiently large to be entirely removed from the influence of the rural environment. This predominance of our rural school population has been kept in view when framing the various courses of the elementary curriculum.

Agriculture is a subject of study for Grades VII and VIII. While it treats every phase of this important industry it is developed from the nature study point of view rather than as a science subject, the course

being designed to be the crown or top stone of the nature study work of the previous grades. This method of treatment is advocated so as to keep the work definitely related to the environment of the pupil, and to permit of such modification of subject matter as will best meet local requirements.

The practical working out of the course seems to indicate that the present method is quite satisfactory. Gardening and poultry hold the chief place of interest in many larger centres without in any way preventing the development of a full course, while throughout the country local interest colours the character of the work being attempted.

BRITISH COLUMBIA

BY J. W. GIBSON, DIRECTOR OF ELEMENTARY AGRICULTURAL EDUCATION.

NO distinction has been made in so far as the nature study course in British Columbia is concerned. Our nature course, however, permits of what might be called adaptation of subject-matter to local conditions, and this is really the all-important principle involved in the differentiation of courses in agriculture for rural schools as compared to city schools. In my opinion the time has come when agricultural education must be featured not in

the country district alone but in the city schools as well, and this on account of the fact that people are congregating in cities more and more, in spite of the so-called back-to-the-land movement. Food production must continue to be a live issue in the urban as well as in the rural districts, and it is along this line that the high cost of living must be attacked and finally overthrown. Every person must learn to produce food, whether working in the store,

the factory, or on the farm. This much for the practical side of agricultural instruction.

THE EDUCATIONAL SIDE

From the educational side, agricultural studies in which we include nature study, school gardening, school supervised home gardening and home projects of an agricultural character—are just as valuable to city boys and girls as to those who happen to live in the country. They are realistic, first hand studies, demanding activity, experimentation, investigation. They tend to arouse in the minds of city children new and healthful interests which are of great importance at the present time, and it is not too much to expect that the city of the future will supply many of the boys and girls who will help to build up a better country life; just as the country has, in the past, given of its best in the up-building of our cities.

Of course the success of the work, either in city or country, is largely a matter of good pedagogy, together with the availability of materials for study. If city children are forced merely to read about and hear their teachers talk about crops and soils and live stock, then by all means let that part of the work be omitted. But if facilities for the growing of

vegetables and cereals as well as flowers are at hand—in other words, if the city school garden can be properly established—it has everything in its favour as an institution for teaching boys and girls the best kind of agriculture.

CITY VERSUS COUNTRY

The character of the work in the city will be, perhaps, more elementary, but also more largely informational; for the child brought up in the city has to learn those simple, fundamental things about soils and crops and animals that are already quite well known to the average country child. In the country, on the other hand, the work should be so conducted as to make the commonplace things of rural life uncommon, by giving to them new significance and a new association. In other words, by introducing into country schools what some one has been pleased to term 'vitalized agriculture', the case of the city versus the country, in matters pertaining to agricultural instruction, would seem to resolve itself into this: *Similar subject matter, but different motivation.* The direct method of instruction must obtain in every case, and only such topics as can be so treated should be used either in the city or in the country school.

MILK TESTING IN SCHOOLS

PRINCE EDWARD ISLAND

BY WILFRED BOULTER, SCIENCE DEPARTMENT, PRINCE OF WALES COLLEGE

AS yet none of our schools in Prince Edward Island are doing any work on milk testing or the treatment of seed for disease. However we are endeavoring

to organize clubs and hope in this way to introduce the work mentioned as we consider it very important.

NOVA SCOTIA

BY MISS IRMA B. CAMPBELL

ACTUAL milk-testing has been carried on in a number of the schools of this province by the travelling rural science teachers for two years, and the results have been eminently satisfactory.

While attending the Rural Science School at Truro we were given special instruction in the work by W. A. MacKay, Superintendent of the Maritime Dairy School, and were furnished with the necessary equipment. This equipment, which is loaned to us by the Dairy Division, consists of a Babcock milk tester, four-bottle size, with standard bottles for milk, cream, and skim milk, measures, thermometer, alcohol lamp for heating water, sulphuric acid, cleaning brushes, and a supply of corrosive sublimate tablets which are used to preserve the milk when making a thirty-day test. The complete outfit is put up in a convenient case. The tester can be screwed to any solid piece of furniture, such as a table or desk.

Our method is to give a series of lessons on dairying, including the composition and uses of milk, care of milk, care and feeding of cows, breeds of dairy cows, the latter including characteristics and original homes of the breeds, with a comparison of their milk and butter fat production and cost of feeding. Along with these lessons we give demonstrations in the testing of whole milk, cream and skim milk, and the pupils keep records of the tests. The older pupils may also learn to do the testing. The pupils bring samples of milk from home, and in many cases the parents become interested and have samples tested regularly.

The agricultural societies and creameries have co-operated with us splendidly, offering prizes for essays

on dairying, and often the judging is done by local dairymen. These essay contests are carried on throughout the province under the direction of H. R. Brown, Promoter of the Dairy Industry. The travelling teachers have charge of the contests in their respective districts, and the prize essays from each district are sent to Truro, where they are judged for the sweepstake prize offered for the highest scoring essay in the province.

The practical teacher gets much besides instruction on milk and cows out of this work. The composition of milk and the feeding of the cow afford material for lessons on food values; the care of the cow introduces the subject of ventilation; in connection with the breeds of cows we can teach geography—the Ayrshire from Scotland, the Holstein from Holland, the Jersey and Guernsey from the Channel Islands, etc.; while very practical arithmetic questions may arise from the percentage of fat in milk, cost of feeding, etc.; and the working of the tester may be used to demonstrate centrifugal force to the class in physics. Writing, spelling, language and composition play an important part in the writing of the essay.

One of the merits of this work is that it is practical. We use a textbook, "Short Lessons on Dairying", by H. R. Brown, but it is not placed in the pupils' hands. They learn to identify at sight the various breeds of cows, visit dairy farms and creameries, keep records of herd and individual production, in short, get information first hand whenever possible.

Prize essays are usually read at some community gathering, such as school closing exercises or school exhibition entertainment.

QUEBEC

BY HON. CYRILLE F. DELAGE, SUPERINTENDENT OF PUBLIC INSTRUCTION

EXPERIMENTS on milk testing, germination tests, the treatment of seed for smut, are carried on in the schools of agriculture of the province, and in some of our domestic science schools, such as those of Saint-Pascal, county of

Kamouraska, Roberval, county of Lac St. Jean. As to the germination test, this is done also in several rural academies with the help of the school garden, particularly at St. Casimir, county of Portneuf.

ONTARIO

BY JOHN TANTON, WINGHAM HIGH SCHOOL, WINGHAM, ONT.

PRACTICAL work in the testing of milk for fat content and of seed for germination has been carried on by the agricultural classes here only to the extent required by the regulations. Samples of milk and of cream were brought in by members of the class and the percent of butter-fat determined by small committees

of the class working under my supervision. A four "cup" centrifuge was used. It and the other apparatus for a Babcock test were bought with part of the grant to agricultural classes.

Germination tests were performed by the students using plates and moist absorbent brown paper.

MANITOBA

BY G. W. BARTLETT, INSPECTOR

REPRESENTATIVES of Lundar, Mary Hill, Stone Lake, Swan Creek and Rocky Hill met at Lundar school to hear an explanation of the plan of the work, and how it could be conducted so as to correlate it with the programme of studies. Mr. Norman Brettell of the Dominion Government Dairy Extension Work conducted milk tests, and assisted the teachers to secure loan of apparatus from the creamery, sufficient to make a start at the work. Eleven students from Lundar, with a number from outside schools, have undertaken the project under the auspices of the Boys' and Girls' Club.

In the morning of May 7th a two-hour visit was made to the local creamery, where the test room and steam turbine tester were inspected, and a cream test demonstration conducted.

Much interest was shown, not only by the pupils and teachers, but also by visiting trustees and citizens. This project has made a good start.

A similar demonstration was held at Eriksdale school in the afternoon and at the creamery in the evening, with teachers and pupils of Eriksdale, Nyland, Eastlands, Hartfield, and Deerhill school districts. A number of citizens were present at the evening demonstration. A test project was initiated with six pupils from Eriksdale and a number from outside points. Mr. Brettell was of much assistance, not only by his interesting demonstrations, but also because he was able to make satisfactory arrangements that saved expense for testing apparatus.

I have been convinced that unless the tests are made by the pupils themselves under the teacher's supervision the greater part of the educational value of the project is lost, and the interest is sure to weaken. We have, therefore, secured the use of the hand-tester (8 bottle, closed in) from the creameries of these towns, and the samples will be tested by the contestants themselves, and cow records

duly entered. Out of town contestants will know the test days and can easily arrange to come in and make the tests one afternoon a month. Pipettes and test bottles, and nearly

sufficient sample bottles have been loaned by the respective creameries, the managers showing the utmost courtesy, interest, and willingness to assist as far as possible in the project.

ONTARIO

PEEL J. F. I. A. UNION

FOR some time the thinking young men in the various Peel County Junior Farmers' Improvement Associations have felt that there should be some central body directing and assisting the work throughout the whole district. A banquet appeared to be the best means of bringing together from the different localities those interested. One result of the banquet and the deliberations which took place at it was the formation of a Junior Women's Institute. After the election of officers addresses by women prominent in agricultural affairs of the province were given. Another result of this banquet was the formation of the Peel Union J.F.I.A. The constitution adopted was as follows:

CONSTITUTION

1. The Association shall be known as the Peel Union J. F. I. A.
2. The Association shall meet at least once a year, with as many additional meetings as would seem necessary.
3. The objects of this Association shall be:
 - (a) To further all aims and interests of the present J. F. I. A. Branches and to stimulate interest in their activity.
 - (b) To hold County Stock Judging Competitions and Public Speaking Contests;

- (c) To arrange inter-society debates and promote other work which concerns the County as a whole;
- (d) To cultivate acquaintance and friendship between the various branches and their members.

4. The officers of the Association shall consist of a President, Vice-President and Secretary-Treasurer, elected at the Annual Meeting, and a Committee of Management or Directors composed of the Presidents and Secretaries of the Branch J.F.I. Associations in the County.

The Association year shall commence on March 1st.

5. There will be no membership fee. Members of the Branch Associations shall be members of the Peel Union J. F. I. A. provided that the branch Association forwards \$5.00 to the Peel Union.

6. Ten members of the Association shall constitute a quorum for the transaction of business. Four members of the Executive shall constitute a quorum for the transaction of business.

7. This Constitution may be amended by a majority vote at any regular meeting.

A president, vice-president and secretary for the major organization as well as a president and secretary for each of the branch organizations were elected.

Addresses to the boys were given by officials of the provincial department of agriculture and also by Mr. S. Charters, M.P., and Mr. Watson, M.L.A. of South Victoria.

SASKATCHEWAN

HOUSEHOLD SCIENCE

BY MISS ISABEL SHAW, ACTING DIRECTOR OF HOUSEHOLD SCIENCE

IN 1915 a branch of the Department of Education was organized under a director for the development of Household Science in the schools of Saskatchewan. The work developed until in 1919 the staff consisted of five members in addition to the regular Household Science teacher at each of the two provincial normal schools.

The activities connected therewith consist in assisting the rural schools in establishing the noon lunch, instruction of teachers at the normal schools, assistance at school exhibitions, discussions at Teachers' Institutes and conventions, instruction at the Summer School for teachers and at special short courses.

During 1919 fifty-four school exhibitions, eleven conventions, and several institutes were visited by members of the staff. In a number of cases addresses were given on special occasions, such as school openings, etc.

On January 10th, 1920, a conference of Household Science teachers was held and a new course of study for High schools and Collegiates was drafted and approved; and on May 7th and 8th, 1920, at another conference, the courses of study for graded and rural schools were revised.

THE SASKATCHEWAN HOME ECONOMICS ASSOCIATION

In April, at the time of the Provincial Teachers' Association, a meeting of all the Household Science teachers in Saskatchewan was held at which an organization was formed to be known as The Saskatchewan Home Economics Association, the object being to co-ordinate the efforts of Home Economics workers in the province by:—

1. Discussion of Home Economics problems.

2. Presentation of information on the subject of Home Economics.

The organization may include as members all graduates of Home Economics colleges who are residing in Saskatchewan.

SHORT COURSE WORK

The winter months were devoted to the special short course work, twenty-one courses being provided with a total attendance of 3,194.

In organizing this work arrangements are made through the Inspector, the Principal of the School, and the School Board. A certain amount of necessary equipment is purchased and an instructor sent out from the Department of Education to carry on the work for three weeks at each centre chosen. These courses have proved to be most popular, the most frequent criticism heard is that the courses are too short.

Through these courses we hope to so interest the general public that the ratepayers will see the value of the work and ask that it be carried on in the schools. In these courses we give demonstrations and lectures showing how the various phases of Household Science work may be carried on in the schools. Sewing is taught in the junior grades to both boys and girls. In the higher grades the boys are given some other work while the girls sew. In some cases all pupils take the work in cookery, though usually these classes are reserved for the girls alone.

In the junior grades canvas mats, napkin rings, handkerchief cases, darns, patches, buttons and button holes, doll's bed outfit, caps, tea aprons, underwear and sometimes children's dresses are the sewing problems.

In cookery we include lessons on cereals, beverages, fruits, soups, bat-

ters, and the serving of meals and of light refreshments.

To the evening classes more advanced work is given. This includes lectures and demonstrations on food, an adequate diet, milk, food for children, salads, fish, cuts of meat, supper dishes and menus for special occasions, etc.

At the conclusion of each course the work of the various grades is exhibited and tea served by the pupils to the parents, teachers, and members of the School Board.

THE TEACHERS.

Whenever possible a meeting for rural teachers has been held and a special lecture given on noon lunch work and sewing in the one-roomed school.

A most generous grant of half the salary up to \$750 will be given by the Government to any districts employing an itinerant teacher of Household Science. This teacher could carry on the work in two or three town schools and in time, possibly, supervise the sewing and Noon Lunch work in the surrounding rural districts. Many of our teachers are willing and anxious to do some Household Science work and excellent results could be obtained if one spe-

cialist were placed in a district to teach the work in the towns and assist the regular teachers in the rural schools.

In addition to this short course work eight six-hour lectures on Household Science in the public schools were given to the Third Class Normal students at Regina, Saskatoon, Moose Jaw, Prince Albert, Yorkton, Moosomin, Weyburn and Estevan.

In co-operation with the other branches of the Department of Education an exhibit was prepared which was shown at the Regina Industrial Exhibition and which featured the work of this branch.

During the summer months certain members of the Department are engaged to assist at the summer session.

A decided advance was made in this work when, acting upon the request of the Department of Education, the University of Saskatchewan decided to give a one-year training course in Home Economics to experienced teachers. Candidates must have at least second-class certificates and three years' successful teaching experience. In this way we hope soon to be able to supply the demand for such teachers from those trained in our own province.

"Perhaps the most vital reason for using agriculture in the education of the country child is that it is in strict accordance with that recognized principle of educational psychology which demands that education should be built upon past experience. If this be accepted the daily experience of the farmyard and the farm home will furnish the groundwork of the teaching in the rural school; it will be the common stock from which other subjects grow, and the extent to which they grow will be limited only by the age and capacity of the pupil and the interest and the enthusiasm of the teacher."

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications, and Notes

ASSOCIATIONS AND SOCIETIES

CONFERENCE OF AGRICULTURAL REPRESENTATIVES

A Conference of Agricultural Representatives stationed throughout the various counties of the province of Ontario was held at the Ontario Agricultural College from July 5 to 9.

On the first day general topics were discussed including, land settlement for soldiers; county agent work in the United States; the wool situation, and lime and fertilizer experiments. A session was devoted to the question of supplies of commercial seed stocks. The scrub bull campaign occupied a half-day. Boys' and girls' club work in the United States was explained and one-half day was devoted to co-operative marketing enterprises. The Honourable Manning W. Doherty attended some of the sessions.

Four principal resolutions were passed: The first suggested the appointment of an

advisory agricultural board in each county to confer with agricultural representatives with reference to agricultural work carried on in the county. A committee of representatives was appointed to go into this matter. The second resolution urges the Minister of Agriculture to bring in legislation making it a punishable offence to keep in the province, for public service unregistered sires. The third urged that permanent assistant representatives be appointed in the different counties. The fourth resolution asked that the supervisor of agricultural representatives and a committee be permitted to make a tour of the states of Michigan and New York, to study and report upon the methods and progress of farm bureau work, and boys' and girls' club work carried on in these states.

CONVENTION OF LIVE STOCK MEN

A convention of live stock men was held in Winnipeg on June 25. The principal purpose of the meeting was to discuss the formation of a national live stock exchange in Canada. Delegates were present from Winnipeg, Toronto, Moosejaw, Calgary and Edmonton, and represented principally buyers and salesmen

of commercial cattle and stockyard superintendents. The meeting appointed a committee to draft a constitution to be submitted to the several Canadian live stock exchanges and to take a vote of all exchanges by mail to decide where and when the organization meeting shall be held.

OFFICIAL HORTICULTURAL ASSOCIATION

At the closing session of the Official Horticultural Association at the Great Plains Convention held on July 9 in Minneapolis, Minn., Ottawa was chosen for the annual meeting in 1921. W. J. Dorsey of the University of Minnesota was elected president,

W. A. Macoun, Dominion Horticulturist, Ottawa, Vice-President, and W. R. Leslie, Fort William, Ontario, Secretary. Among the Board of Directors are Norman H. Ross, Indian Head, Sask., and F. W. Broderick, Winnipeg, Man.

QUEBEC HOMEMAKERS' CLUBS

The Seventh Annual Convention of the Quebec Homemakers' Clubs was held at Macdonald College on June 16th and 17th. Seventy-nine delegates from English-speaking clubs attended. Miss Armstrong, President of the Club, enumerated some of the problems confronting Homemakers' Clubs. These included the shortage of labour; the unrest amongst the people; community improvements, particularly in the betterment of the

public school. Parent-teacher's clubs were instanced as a means of encouraging co-operation between home and school. The question of dress was emphasized as one needing attention. Miss Chute, Superintendent of the Clubs, reported that fifty-one clubs, within the province, had been established. Eleven clubs had been formed during the year. The activities of the clubs included lectures and demonstrations, providing of musical

instruments, equipment for school lunches, and drinking fountains for the schools. Provision was also made for medical inspection. School fairs were also assisted. Help was given in establishing and furnishing community halls. Assistance was provided for

hospitals for needy families. The circulating libraries used by the clubs were in constant use. Proposed plans for new work included child-welfare work. By resolution, it was decided to change the name to the Women's Institutes of Quebec.

SASKATCHEWAN AGRICULTURAL SOCIETIES

Girls' Convention

A girls' convention was held at the University of Saskatchewan on June 7 to 12 under the auspices of the Agricultural Societies. The programme which consisted of canning, cooking, nursing, millinery, dressmaking and kindred subjects was drawn up and carried on through the Department of Women's Work at the University. The main idea underlying the convention was to enable the girls to carry back to their various districts some ideas for community work. Regular day sessions were devoted to the more serious matters. Evening sessions were devoted to community singing, folk dancing, physical culture and reading. The students which numbered 67 stayed at the University

residence. The Department of Agriculture provided the railway fare of one delegate from each agricultural society. In many cases the agricultural societies sent a second delegate at their own expense. The household science demonstrations were conducted by Miss Esther Thompson of the Homemakers' Department; Dressmaking and millinery by Miss Myrtle May of the same department; Home Nursing by Miss Allan of the Bureau of Public Health; Physical Culture by Miss Kennedy of the Manitoba Agricultural College. The convention itself was carried on under the direction of Miss Abbie DeLury, Director, Homemakers' Clubs.

THE SASKATCHEWAN STOCK GROWERS' ASSOCIATION

The eighth annual convention of the Saskatchewan Stock Grower's Association was held at Shaunavon on June 9 and 10. President Byers was in the Chair. Dr. D. J. Sykes, M.L.A., reported on the demonstration farm to be established by the Federal Department of Agriculture at Swift Current. Lieut. J. G. Robertson, Provincial Live Stock Commissioner, addressed the convention urging the importance not only of numbers but of quality in live stock. He pointed out that at present only 49% of the beef going to market from Saskatchewan was classed as good. He said that good work had been done in the province through stallion enrolment and inspection. A number of resolutions were passed, among them approving the order-in-council relative to the extension of the time for the remission and refund of duty on meat cattle imported into Canada (see order on page 561 of this number of THE AGRICULTURAL GAZETTE); soliciting the Board of Railway Commissioners to order that a transfer track be placed at Conquest; requesting the transportation authorities to construct wells at intermediate points for the purpose of watering live stock; requesting that the Royal Canadian Mounted Police continue its former duties to stamp out stock rustling in Western Canada; requesting the Dominion and provincial Governments to co-operate with a view of having a survey made of the rough and sandy hill lands of the province; petitioning the Saskatchewan Government to amend the law so that grade bulls found running at large shall be castrated; urging the

amendment of the Saskatchewan Horse Breeders' Act so as to prevent any grade stallions from standing for service anywhere in Saskatchewan; approving the securing of pure-bred Clydesdale and Percheron stallions by the Government for service in the province and requesting the provincial Government to establish a demonstration farm under the supervision of the Saskatchewan Department of Agriculture in the district from Assiniboia to Altawan, to carry on experimental work with particular reference to suitable forage crops and the raising of live stock. Dr. Hargrave, Dominion Veterinary Inspector, Medicine Hat, addressed the assemblage on the mange situation. Mr. Dan Johnson of St. Boniface, Manitoba, Dominion Inspector of Stock Yards in Western Canada, gave information about handling stock from mange areas. Professor Bracken, now president of the Manitoba Agricultural College, reviewed his ten years' research work at the Agricultural College farm at Saskatoon. Dean Rutherford explained the agricultural courses at the University for farm boys, who are admitted without examination. The Dean also gave a review of the live stock history of the province. The next annual meeting will be held at Maple Creek. The officials elected for 1920-21 are Hon. Pres. Wm. Ogle, Wood Mountain; Vice-Pres. Olaf Olafson, Mortlach; Sec. Treas., Hugh McKellar, Moose Jaw; Executive, Freffle Bonneau, Willow Bunch; J. H. Grayson, Moose Jaw; G. L. Valentine, Pennant; J. F. MacCallum, Webb; D. J. Wylie, Maple Creek.

BRITISH COLUMBIA JERSEY BREEDERS' ASSOCIATION

At the summer convention of the Jersey Breeders' Association of British Columbia which was held in the Cowichan District on May 26 and 27, the following rules were adopted to govern the Jersey calf clubs:—

1. Work to be organized and supervised under the direction of W. T. McDonald, Superintendent of Boys' and Girls' Clubs with the co-operation of the Jersey Breeders' Association.

2. Approved note to mature at not longer than three years from date of purchase and the price not to

exceed \$150, at point of purchase with interest at 6% per annum.

3. Committee to approve of calves and place value on same.

4. Calves to be supplied to boys and girls on farms where there are at present no pure-bred female dairy cattle.

5. The Jersey Breeders' Association of B.C. to undertake to supply up to 40 calves. This offer to hold good till November 1st, 1920.

6. The Committee to consist of Prof. W. T. McDonald of Victoria and Prof. J. A. McLean of the University of British Columbia, Vancouver, together with one member of the Jersey Breeders' Association to be named by these two gentlemen.

CARLETON COUNTY BEE-KEEPERS' ASSOCIATION

On Friday, June 25, the Annual Field Day of the Carleton County Beekeepers' Association was held at the Experimental Farm, Ottawa. A talk was given on swarm control by Mr. F. Eric Millen, Provincial Apiarist, of Ontario, and a talk and demonstration on queen breeding by Mr. F. W. L. Sladen, Dominion Apiarist. Mr. Millen outlined the following points necessary for the control of swarming:—(1) Careful breeding and selection of queens that show non-swarming characters; (2) Plenty of room for the queen, and abundance of stores at all time to stimulate brood production; (3) Ventilation during the hottest part of the summer; (4) Maintaining the morale of the colony. Interference at the wrong time causes more

harm than good by upsetting the spirit of the hive. Under preventative measures, three methods were given:—(1) The cutting out of all queen cells, this being a laborious method and not always successful; (2) By removing the queen from the colony, which often causes the bees to slack up in their work during a honey flow; (3) The separation of queen and brood, a method that is practiced by most beekeepers and that keeps a colony together and in good working conditions during the honey flow. In his paper on "Queen Breeding", Mr. Sladen pointed out the different steps necessary for the successful breeding of queens from desired parentage.

NEW PUBLICATIONS

THE DOMINION EXPERIMENTAL FARMS

Seasonable Hints.—The number of this publication for July, August, September and October, tells why hay should be cut at the proper time, and supplies points regarding the summer care of the strawberry plantation; also regarding potato spraying; the importance of the pure bred sire; skim-milk and substitutes for swine; summers' work among the poultry; crop rotation; tile drainage experiments; fall ploughing and manuring tobacco land, and the canning, drying, and storing of fruits and vegetables.

THE DAIRY AND COLD STORAGE BRANCH

Dominion Educational Butter Scoring Contest.—The report for 1919 of the Butter Scoring Contest makes a pamphlet of twelve pages, in which a complete record is given of results and achievements.

The Finch Dairy Station Bulletin No. 55, of the Dairy and Cold Storage Commis-

sioner's series, gives a report of the progress of the Finch Dairy Station, prepared by Messrs J. A. Ruddick, Dairy and Cold Storage Commissioner, and Geo. H. Barr, Chief of the Dairy Division.

The Dairy Industry Act.—The Dairy and Cold Storage Commissioner has issued a circular explaining and detailing the Dairy Industry Act, 1914, and Regulations. This circular may be had on application to the Publications Branch, Ottawa, or to the Dairy and Cold Storage Commissioner.

THE FRUIT BRANCH.

Fruit and Vegetable Crop Report No. I.—A very complete report of matters relating to last year's fruit and vegetable crop is given in this sixteen-page circular, along with some facts about fruit prospects in the United States, transportation notes, package conditions, etc. Circular No. 2 has also been received. It treats of "Preserving Early Fruits and Vegetables," and contains as Table No. I, "The Housewife's Fruit Buying Chart."

QUEBEC

The Annual of the School of Veterinary Medicine of Montreal gives details of studies required at the school along with various records and lists of awards.

The Message of the Rossignol.—Here is a very attractive eighteen-page brochure got up in neat form and published by the Society for the Protection of Birds of the Province of Quebec. Interesting notes are supplied on matters connected with the protection of birds and the establishment of sanctuaries.

ONTARIO

Horticultural Societies' Report for 1919.—This report contains a record of the 14th annual convention of the Ontario Horticultural Society in Toronto on Thursday and Friday, February 5th and 6th, 1920, including the various papers read thereat and the financial statement for the year, along with a list of secretaries and other particulars concerning the Society and its affiliations.

Bee Diseases in Ontario, by F. Eric Millen, Provincial Apiarist, Bulletin No. 276 of the Ontario Fruit Branch, treats bee diseases with illustrations in twenty-four page form. It is a publication that should find general circulation among bee-keepers, in so far as it touches fully upon diseases to which bees are subject. It also contains the Act, passed by the Legislature in 1911, for the prevention of diseases among bees.

Disinfectants and Their Use on the Farm and in the Home, by D. H. Jones, Professor of Bacteriology, Ontario Agricultural College, and *The Purchase of Milk and Cream on the Butter-fat Basis* are circulars Nos. 29 and 30, issued by the Ontario Department of Agriculture.

Transferring of Bees, by F. Eric Millen, Provincial Apiarist. Circular No. 27 of the Fruit Branch of the Ontario Department of Agriculture, is a twelve-page pamphlet liberally illustrated, dealing fully with the subject of its title.

The Annual Report of the Beekeepers' Association.—This is a seventy-two page blue book containing a verbatim report of the 40th annual convention of the Ontario Beekeepers' Association in Toronto on November 11th to 13th, 1919. Papers are incorporated by a number of authorities on bee-keeping topics.

SASKATCHEWAN

The Ploughing Match, by J. McGregor Smith, B.S.A., is a twenty-page circular supplying, with illustrations, plans, rules and regulations for ploughing matches.

ALBERTA

Native Grasses of Alberta, 1, 2 and 3.—Extension Circular No. 3, Series 7, of the Alberta College of Agriculture, presents a co-operative study by G. H. Cutler, Professor of Field Husbandry, and R. Newton, Assistant Professor of Field Husbandry, dealing exhaustively with the grasses of Alberta, their structure, seeds, seedlings and flowers, with directions for study.

BRITISH COLUMBIA

Report of British Columbia Dairymen's Association.—This gives, besides the constitution and by-laws, in twenty-page form, addresses made and resolutions passed at the annual conference held in Vancouver on January 21st and 22nd of this year. In connection with the report is issued a special circular entitled "The High Cost of Bacteria," being a lecture by Professor Wilfred Sadler, of the Department of Dairying at the University of British Columbia.

MISCELLANEOUS

Canadian Shorthorn Annual for 1919.—Here we have a well compiled and well printed publication of seventy-seven pages, giving records of performance, along with illustrations of the winning Shorthorns at leading exhibitions, and much other information of value to breeders.

The Canadian Ayrshire Herd Book, Vol. 29, issued by the Canadian National Live Stock Records, contains registrations from 61996 to 67020. Mr. A. R. Dawson is the registrar. The volume contains the constitution and by-laws of the association, reports of meetings, both in French and English, as well as the records of performance and the registrations in detail.

Clydesdale Stud Book of Canada, 1920, Vol. 28, contains registrations of stallions from No. 21095 to 22089, and of mares from 42576 to 42867. It makes a book of 622 pages and is compiled and edited in the office of the Canadian National Live Stock Records, Ottawa, Ont. Mr. S. Harvey is the Registrar.

The Holstein Friesian Herd Book.—Volume twenty-three of the Herd Book of the Holstein Friesian Association of Canada contains a record of the Holstein Friesian cattle approved and admitted for registry, since the publication of the previous volume. The record numbers for bulls from 37,851 to 42,400 and for cows from 62,876 to 72,600. It also contains a list of the members of the association, the minutes of the latest annual meeting, and the constitutions and bylaws.

NOTES

Mr Armand Letourneau, B.S.A., has been appointed associate editor of *The Agricultural Gazette* for the provincial Department of Agriculture at Quebec.

The United Farm Women of Manitoba are arranging a special two-weeks winter course at the provincial University for rural workers, in order to fit them for more effective community and public work.

R. Newton, Assistant Professor in the Department of Field Husbandry at the College of Agriculture, University of Alberta, is making an investigation of the situation regarding forage crops, legumes and grasses, in the Peace River country.

Hon. Chas. M. Hamilton, Minister of Agriculture, Saskatchewan, has resigned the Presidency of the Saskatchewan Association of Rural Municipalities. Murdo Cameron, M.L.A., Saskatoon, and vice-president of the Association, will continue Mr Hamilton's work as president until the next annual convention.

The Saskatchewan Government has appointed a committee to make a survey of the south-western part of the province, with the object of determining more successful methods of agriculture for those districts that have suffered two or three successive crop failures on account of drought.

Mr. W. E. Ashton, a graduate of Macdonald College, Quebec, has been appointed field man for Ontario and Quebec by the pure-bred Jersey breeders. His headquarters will be at Brampton, Ontario. Mr. Ashton was a member of the Macdonald judging team at Chicago in 1919 and belonged to the Canadian Air Force during the war.

The University of Alberta is co-operating with the United Farmers of Alberta in supplying technical information for the junior members of the United Farmers. The professors in the College of Agriculture prepare treatises which are distributed by the United Farmers to the junior members. These treatises deal with such subjects as the study of farm crops.

On July 3rd the Niagara district was visited by a severe hailstorm and much damage was at first reported to the bearing fruit trees. Agricultural Representatives R. J. Brydon, of Welland, and Geo. Wilson, of Lincoln, travelled through the district and found that the damage, except in Stamford township, had not been quite as severe as at first feared.

The scope of the Alberta Cattlemen's Protective Association is to be extended so as to cover the live stock industry in all of

its branches in Western Canada. The title of the Association has been changed to that of The Stock Protective Association of Western Canada. These decisions were come to at the annual meeting held in Calgary on July 2.

A land army of 100,000 farmers, handled, recruited, and organized by the Department of Agriculture at Washington, have been employed harvesting in the western wheat belt. Director Taylor of the Farm Bureau at Washington stated that for the first time in years farmers had not been handicapped through labour shortage. A wage of \$7 for a ten-hour day was paid to the harvesters.

Saskatchewan has adopted a new system of examining stallions for licenses. Up to the present, official examiners have been sent out to stallion owners to examine the horses on the owners' premises. This year the examiners are visiting central points and stallions are being brought in for examination. The licenses are good for three years, at the end of which time all stallions must be re-examined.

The United Farmers of Quebec and the Union of Cultivators held a convention in Montreal on June 29, when it was agreed that each body would work separately, but would assist each other as far as possible. To concentrate the agreement it was decided that three directors of each organization should be replaced by three of the other organization. The Union of Cultivators has for one of its objects the establishment of a standard price for farm products and the improvement of markets.

The Chamber of Commerce of the United States, in a formal resolution recently passed, decided to invite various agricultural organizations into membership on a similar basis as the commercial and trade organizations. In the resolution it was declared that to draw a line of cleavage between agriculture and business was unnatural, unhealthy, and injurious to both parties. As soon as the membership of agricultural organizations justifies it, it is proposed to give agriculture the same representation on the Board of Directors as the other departments of the Chamber possess.

Mr. P. Stewart, Head Office Agriculturist of the Soldier Settlement Board, Ottawa, on his return from a tour of inspection in New Ontario, where he visited numerous settlers at Sudbury, Sault Ste. Marie, Liskeard, Fort William, Dryden, and Emo, reported, generally speaking, satisfactory results. Except in a few instances, soldier settlers were located on the main highways, close to shipping points, schools and churches. For the

most part the men were on good land that had been bought at fair prices. The type of settler also is good.

A branch of the Militia Department has incorporated a skeleton organization of a Veterinary Corps, and has appointed Doctors Tamblin and Evans on the permanent staff for this purpose. Both doctors were overseas and held the rank of Lieutenant-Colonel. Dr. Tamblin will be stationed at Calgary and Dr. Evans at Toronto. The latter was a member of the Pathological staff of the Health of Animals Branch. Both had been connected with the Health of Animals Branch for some years, and the Veterinary Director General expressed extreme reluctance to part with them.

The Agricultural Department of Saskatchewan is purchasing 100 good young grade dairy cows and heifers in Eastern Canada at an estimated cost of \$10,000, for resale on easy terms to *bona fide* dairy farmers. Only farmers at present engaged, or who are entering the dairy business, and will agree to have these cows bred to pure-bred sires of the same breeding, will be allowed to effect a purchase. Mr. A. J. Clark, of the provincial Live Stock Branch, is at present in Eastern Canada selecting and buying the dairy cows. He is trying to secure good milking Shorthorns, but failing these, he will purchase grade Holsteins and Ayrshires.

At the Montana Experiment Station one lot of milch cows was fed grain and clover hay, while another lot was fed grain, clover hay, and sunflower ensilage. Both lots received the same amount of grain. The result of milk yield was an average of 37.33 lb. per day per head for the lot receiving grain and clover. The lot receiving sunflower ensilage in addition yielded an average of 34.35 lb. per head. A saving of approximately 9 lb. of clover hay per head per day was effected by substituting sunflower ensilage. An average daily allowance of 34 lb. of sunflower ensilage was fed to each cow in the best producing lot. No objectionable flavour was noticed in the milk of the cows fed with the sunflower ensilage.

By order-in-council, on the recommendation of the Minister of Interior, certain areas in Alberta have been set aside as bird sanctuaries for the purpose of furthering bird protection in accordance with the Migratory Birds Convention Act. It is claimed that the Great Plains region of Canada is the most important breeding ground for wild water-fowl. Careful investigation has been

made by an eminent zoologist of the areas occupied by this field bird life in Alberta, and his report has been the basis for the selecting of these bird sanctuaries. It is pointed out that the United States has created a series of sanctuaries to protect wild fowl on their migration to the south and east and has also set aside large areas to protect them on their winter feeding ground.

At several meetings of Shorthorn breeders held in Alberta, Saskatchewan, and Manitoba resolutions were passed asking the Dominion Shorthorn Breeders' Association to double the registration and transfer fees, the extra money accruing from this increase to be returned to the provincial associations to be used as prize money at the smaller fairs. The recommendation will receive the attention of the Dominion Association in due course. There has, however, been a general increase in the fees and registration of nearly all the Live Stock Associations working under the Canadian Live Stock Records. The Shorthorn fees are now as follows:—To members: animals under one month, \$1 for every registration; animals over twelve months and under five years, \$10 for each registration. Animals over five years cannot be registered. To non-members the fee for registration of animals of under twelve months is \$2 for each registration and for animals over twelve months \$10 for each registration.

The Women's Institutes of the Ottawa district held a meeting on June 25, at the Central Experimental Farm. An address was delivered by Mrs. Greer, of Toronto, on the activities of the Institutes, making special reference to the necessity of a good water supply in rural schools; urging that women who had played so noble a part during the recent war should not creep back into a shell and let the world drift on, but should take active part in reconstruction and progression; suggesting that there should be a due proportion of women among School Board Trustees, that women should supervise schools and school yards, and that they should have a deciding voice as to what should be taught to their children. Following the address, the ladies in attendance made a tour of the Experimental Farm.

The British Columbia Poultry Association has issued a leaflet to its members advising the removal of male birds from the flock and pointing out that the egg industry is seriously injured by the presence of fertilized eggs. The additional reason is given that the unnecessary males are expensive to feed.

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PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

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DAVID LUBIN AND THE INTERNATIONAL INSTITUTE OF AGRICULTURE

ADDRESS BY SIGNORA OLIVIA ROSSETTI AGRESTI, BEFORE THE MASSACHUSETTS AGRICULTURAL COLLEGE

Among recent notable visitors who have visited the United States in the interests of agriculture there is one whose mission was especially in the interest of International Agriculture. This was Signora Olivia Rossetti Agresti, niece of the poet Rossetti, and formerly secretary to David Lubin, the American citizen who by the grace of the King of Italy founded the International Institute of Agriculture at Rome. The importance of the position and of the work of the Institute is set forth in the following abstract of an address delivered by Signora Agresti before the Student Assembly of the Massachusetts Agricultural College, January 28, 1920.

On October 4, 1904, sixteen years ago, an American came to Rome—not an unusual thing for an American to do—but he did not come as a tourist. He came as a missionary. He came to convert the king. David Lubin was a California merchant and farmer. When one is both one has a chance to do some thinking. As a merchant he carried out many new methods of fair trading. As a merchant he was able to get fair play with regard to prices. As a farmer he found himself powerless. He discovered that there was no consistent relation between crop prices and the actual crops. Prices were fixed by elements beyond his control. He determined to find out what these elements were. He found that prices were affected for the California farmers (fruit growers) by the handling of their products by the railroads and by the commission merchants. He went to the railroads and tried to convince them that they would gain permanent prosperity by combining with rather than against the farmer—that prosperous farmers made better security for the companies than selling their bonds at higher prices in the big cities. He went to Washington. At Washington he found a well-established method of crop reports, but he found also that the matter did not end there. It was international. A rumor of locusts in Agen-

tina or of a shrinkage of wheat crops of Russia would cause alarm in the market. The fact that there was no co-ordinating method of keeping the crop reports of the various nations and that in most countries the reports were private reports and liable to bias even if not to wilful misrepresentation, prevented any common basis on which to rest results. The market was unduly influenced by mere rumours.

David Lubin tried to interest our government in taking the initiative in forming an international chamber of agriculture whose duty it should be to follow up the crop reports of all countries and to make this knowledge available to the farmers—but this government was not interested in such a project. It thought its own agriculture was all that concerned it. It wanted to keep away from any mixup with other countries. David Lubin then decided to take his idea to the Old World. In England he didn't get far with it. In France he encountered the difficulty of the language. He turned to Italy. He had a romantic and exaggerated idea of the power of kings. He thought a king could do whatever he wanted. He didn't know that the modern king of a constitutional monarchy has really less power than the President of the United States. He was fortunate in Italy in first telling his idea to M. Luzzatti, the Minister of Finance, who had already done much for co-operation in Italy. Mr. Lubin saw that there was an economic tripod supporting society. He was fond of illustrating this by placing his three fingers on the table. "These two front fingers," he said, "represent city industry and city finance, the third finger behind these represents the farm. When these two front fingers grow strong as they do by combination, they bear back heavily on the third and as this third finger all alone grows proportionately weaker it cannot uphold the extra pressure. What happens? All three go down and with them the superstructure of society." David Lubin foresaw

some such economic crash unless the condition of the agriculturist was proportionately strengthened and bettered. His plea before the King of Italy was not a sentimental plea for the farmer as a class—but a plea for all classes.

He gained audience of the king at his little shooting box near Pisa. He was told there were certain requirements of etiquette such as a tall silk hat, a special colour of gloves, etc. But in California where he had lived a tall silk hat would have invited stoning and he was not used to wearing one—he was going to wait before buying the tall silk hat until he was at least sure of his audience with the king. But word came at 9 p.m. Sunday that he was to go into the king's presence on Monday at 9 a.m. There was accordingly no time to obtain his tall silk hat. So he went as he was. Ten minutes was the usual time of a royal audience: The officials of Pisa waiting for David Lubin to leave the king's presence watched the clock, five—ten—fifteen minutes passed, a half an hour—not until the end of three-quarters of an hour did David Lubin reappear and then the king was smiling and Mr. Lubin wore a broad grin. He had accomplished his object. He had told the king that a private man counted his profits by dollars, but a king counted his by what improvement he had been able to carry through for his people. He then set before him the plan he had thought out of a Parliament of nations or an international chamber of agriculture where all matters relating to the interest of all farmers could be studied and conferred upon, especially through the crop reports of all nations. He showed the king how such a thing would benefit Italy and why Italy was especially fitted to be the prime mover in it. She was neither one of the world's principal sellers nor one of its foremost buyers. Therefore her action in this line could not arouse the suspicion of any country. The king was convinced and said he would confer with his ministers and if they approved he would do what he could to put it through. They did approve and a Royal Proclamation was issued calling an international conference to which thirty-eight powers responded.

Today fifty-eight powers have ratified the Treaty of this Practical League of Nations. It was the only international organization for peace purposes which continued its work through the war. It was able to handle problems and carry on its own work throughout the war and to it all the food commissions of the war looked for the data upon which to base their food conservation plans. It received crop reports from every country enrolled up to the moment Russia went to pieces.

At the opening of the Institute it was difficult to get reports from Russia—and as David Lubin said, any crop-reporting system that did not receive crop reports from Russia would be a mere joke. Russia sent delegates

but no reports. What did David Lubin do about Russia?

He asked the delegates for their reports, they smiled and said "No." Russia was a big country and it would cost a lot. Two self-evident truths, that David Lubin was not satisfied to take as final. He packed his valise and started for Russia. When he reached St. Petersburg he was told by the Italian ambassador that he would better let him handle his speech to the Russian Minister of Finance, as he, David Lubin, did not understand diplomacy. "Very well," said David Lubin. So they repaired together to the great man of state finance. He told the ambassador what to say and the ambassador translated it into diplomatic terms. The ambassador talked half an hour, the Russian man of state watching the clock. David Lubin saw that at the end of the half hour not a thing had been gained. He had not come to Russia for this. So he said to the Italian ambassador, "You have put my request in a diplomatic way and you have left out everything. I do not understand diplomacy but if you will let me speak plainly I think I can make this gentleman understand. So they both smiled and said, "Go ahead!"

Then David Lubin said to the Russian Minister of Finance: "I see men seated around a table interested in a game of checkers,—so intent that they see nothing else. Every now and then some one from under the table kicks the leg of one or the other and for the moment disconcerts the players but only for a moment." "Now," he said, "these men are your great financiers,—your price fixers. The checkers they play with are the food supplies of Russia. The Russian people and the Czar of Russia are under the table—they are powerless against them. Take your Czar and your people out from under the table and let them know by actual figures what is going on. It will not be a greater expense to let them and the world know what are the actual conditions of crops in your country than to let these men keep all the rest of you in ignorance while they take advantage of your ignorance to get all the profit for themselves.

"You have a great idea there, Mr. Lubin, said the head of finance, "and what you say is true."

After that, Russia organized her crop reports and sent them to Rome like the other nations. Mr. Lubin set this League of Nations in motion, he was a citizen of America and until his death he was always at Rome—always "on the job." He spent his time looking over the whole international field to see what he could learn from other countries that would benefit American agriculture. He learned that Belgium, Germany, Italy—were far better organized for farm credit than this country. He got the United States to appoint a commission to study co-operation in Rural Credit and

Finance. This Commission was sent to Europe in 1913. Following the plan laid out by David Lubin, they studied the subject and as a result the United States established the Federal Loan Banks for farmers.

By the recent death of Mr. Lubin the position of delegate to the Institute at Rome from the United States is left vacant. They have no representative there.

If there is to be a league among nations for keeping peace, it cannot be a mere political league—it must be a working league. Such is the Institute at Rome, tried and tested, such is the International Postal Service and

an International System of Finance is soon to come. It is through such international co-operation that there will come about a practical League of Nations. A merely political League through constant political changes would be too unstable to build upon. The League of Nations must be lifted above this. Will you let the world think that your United States have no interest in doing your part to carry on the work begun by one of your citizens? Or will you make haste to appoint a worthy successor to continue the work of David Lubin?

SCIENCE AND PRACTICE OF AGRICULTURE

CROPS AND CULTIVATION

Duty of Water in Irrigation.—POWERS, W. L., in *Oregon Agricultural Experiment Station, Bulletin* 161, pp. 20. Corvallis, Oregon, 1920.

A summary is given of 12 years' irrigation experiments on brown silt loam soil of good fertility, conducted partly in co-operation with the U.S. Department of Agriculture.

The data reported are based on about 600 seasonal plot products and some 30,000 soil moisture determinations. Staple field crops were grown on duplicate one-tenth acre plots under field conditions and measured quantities of irrigation water pumped from a creek were used. A summary of the 12 years' experiments indicates that all crops gave an increase from the use of water, and in all cases the profits have been substantially larger where the crop was raised under irrigation. Except for corn, the water cost of dry matter has been distinctly less with irrigation, the difference being on the average 15 to 20 per cent less. The gain in net profit per acre for the irrigation treatment over the dry treatment ranged on the average from 87 cents with corn to \$23.96 with potatoes.

It was found that alfalfa and other meadow crops required relatively large amounts of water, and without irrigation their growth is checked in June. Two irrigations gave better results than one in dry seasons, the water being applied for the third and fourth cuttings. With a good head of water the strip border method of irrigation was found to be adapted to this silt loam soil, while with a smaller head the use of the corrugation method was necessary.

Potatoes, beans, and other cultivated crops require in this climate only a moderate amount of supplemental irrigation. With beans, one moderate soaking at the time they are coming into full bloom followed by thorough cultivation is generally the most profitable. With potatoes, a uniform moderate moisture content is the important

factor in keeping them growing at an even rate. This is best maintained by moderate irrigation when the potatoes are coming into bloom and further irrigation when they are about finished blooming. Beets have been more profitable under irrigation than corn or kale. They make their growth late in the season and are somewhat benefited by a second irrigation. It may not be profitable, however, to apply late irrigation, or a second irrigation, to beets, except in dry seasons. Grain, when planted in the fall, is not itself greatly benefited by irrigation, though some increase in yield has been obtained. Spring grain in dry seasons has been very substantially benefited by irrigation.

Data on the economic duty of water showed that the following average quantities of water gave the most profitable returns: Beets, 11.38 in., beans 8.6, grass 21.88, alfalfa 20.64, clover 19.28, and potatoes 10.12 in. Data on the effects of rotation on the economical use of water showed a difference of \$6.63 net profit per acre in favour of the irrigated rotation. Rotation both with and without irrigation resulted in an increase in yield and profit and a decrease in water cost. With irrigation, increase in yield and profit was greater especially in the closing years of the period.

The factors affecting the economical use and duty of irrigation water are summarized in some detail.

Rate of Absorption of Soil Constituents at Successive Stages of Plant Growth.

BURD, J. S., in *Journal of Agricultural Research*, Vol. 18, No. 2, pp. 51-72, Washington, D.C. October, 15, 1919.

In continuation of previous investigations, the author reports investigations carried on at the California Experiment Station in which the absorption of soil constituents by barley at different stages of growth is shown. Summarizing the results of his investigation, the author states:

The absorption of certain soil constituents by barley is characterized by three distinct phases, coextensive with the more important

stages of vegetative development. The first of these covers a period of progressively increasing rate of absorption, ending about the time heads begin to form. At this time the absolute amounts of potassium and nitrogen contained in the plant approach the magnitudes present at complete maturity. The potassium content may even be greater than at maturity. The beginning of the second phase is indicated not merely by a decreased rate of absorption as in maize but by definite and substantial losses of certain constituents (notably potassium and nitrogen and apparently calcium) from the portion of the plant growing above the ground, and presumably from the entire plant. This loss takes place concurrently with the migration of the same constituents into the developing heads. The end of the second phase is characterized by a tendency to absorb again the soil constituents previously lost. This tendency may result in taking up considerable quantities when the plants are very large and well developed. The third phase, occurring at the time of ripening of the grain, is marked by a practically complete cessation of absorption of all constituents and an actual loss of most of these.

The more significant facts brought out here would appear to be: that the two elements with which plant growth in general is most closely associated may approach or exceed their maxima at a comparatively early stage of the plant's development—that is, at the beginning of head formation; that absorption of potassium and nitrogen during the first period of growth is approximately proportional to the growth attained, and in the succeeding periods the final dry-matter content of the crop more than doubles without any very substantial increase in nitrogen content and with an actual loss of potassium; furthermore, that the final dry-matter content of the crop, even when it varies as much in yield as in the cases reported, appears to be nearly proportional to the fresh weight of the crop at the end of the first period. A direct relation is thus traced between the amount of dry matter in the final yield and the amount of potassium and nitrogen absorbed in the first stage.

The fact that nitrogen and potassium tend to leave the plant just after the heads begin to form does not prove that their presence is inimical to head formation, but indicates rather that continued absorption at this stage is probably incompatible with normal development.

Seventeen Years Experiments in Crop Production.—JORDAN, W. H., and CHURCH, G. W., in *New York State Agricultural Experiment Station, Bulletin* 465, p. 20, Geneva, N.Y., 1919.

Seventeen years' rotation experiments with corn, oats, wheat, and grass are reported, (1) to determine relative production of crops with farm manure, complete commercial

fertilizer, and acid phosphate, supplemented by a small application of sodium nitrate, (2) to compare farm manure with complete commercial fertilizer, (3) to determine the influence of clover as a factor in fertility, and (4) to determine the value of soil analysis as a means of measuring fertility.

The largest yield of crops, measured in terms of dry matter, was with farm manure, although this did not greatly exceed the production with complete commercial fertilizer. Both the farm manure and the complete commercial fertilizer produced approximately 56 per cent more dry matter than the plats receiving no fertilizer. The plats receiving phosphoric acid with partial nitrogen and no potash produced about 33 per cent more than the untreated plats. The production of dry matter with the farm manure and complete commercial fertilizer was in the proportion of 118.3 for the former to 113.9 for the latter. If, however, allowance is made for the difference in yield of hay due to the fact that timothy sod was maintained for only one year, and comparison is made of the cereal crops produced, the relation of farm manure to commercial fertilizer was as 91:90 with clover in the rotation, and with timothy in the rotation, as 84:89.

A comparison of the clover plats with the timothy plats showed that in the 17 years there were produced of all crops 29,800 lbs. more of dry matter on the clover plats than on the timothy plats. However, on the basis of the cereal crops the difference in favour of clover was 13,500 lbs. of dry matter. These results indicate considerable advantage from the use of clover. A study of the yield of dry matter on the plats receiving no fertilizer, one with clover in the rotation and the other with timothy, showed that production was maintained on these plats as effectively with timothy as with clover in the rotation. The yields following the first rotation were maintained without any essential drop.

A comparison of the analysis of the soils on the several plats before and after 17 years of cropping showed no differences or changes which gave either any indication of the effect of the unlike systems of treatment or of the unlike productivity of the plats at the end of 17 years. A comparison of the results of the experiment on the basis of the cost of the fertilizers and the value of the crops showed that the cheapest increase of production was with acid phosphate combined with a minimum amount of nitrate of soda.

The Maintenance of Soil Fertility.—Ohio Agricultural Experiment Station, Bulletin 336, pp. 579-649. Wooster, Ohio, 1919.

This bulletin reports average data of 25 years' field experiments at Wooster, Strongs-ville, Germantown, Carpenter, and Findlay with manures and fertilizers and average data for 5-year and 6-year periods, the last pro-

gress report of which was contained in Bulletin 303 of the station.

The soils employed in these experiments have included silty clay loams derived chiefly from sandstones and shales and relatively deficient in lime, and heavier clay loams derived from limestones and limestone gravels. Most of these soils were below the average soils of the region in which they are located in productiveness at the time the experiments were begun.

Great differences were found in the requirements of these soils for lime. Every soil included in these experiments, whether derived from sandstone or from limestones, has responded profitably to applications of phosphorous. Of the carriers of phosphorous used, acid phosphate proved the most effective in proportion to cost, followed in order by basic slag and steamed bone meal. Finely ground raw rock phosphate returned a profit on its cost, but the effectiveness of acid phosphate was so much greater as to make the use of raw rock phosphate relatively unprofitable.

Potassium generally increased crop yields, and when used as a reinforcement of phosphorous and in relatively small quantities its use at normal prices was profitable, especially on potatoes and tobacco. It was found that the maintenance of the nitrogen supply of these soils was of no less importance than that of lime or phosphorous, but that owing to the cost of purchased nitrogen the growing of leguminous crops in rotation and the careful saving and use of animal manures must be the chief means of obtaining nitrogen for economically managed Ohio soils.

The possibility of greatly increasing the effectiveness of manure by protecting it from the losses due to heating and leaching and by reinforcing it with phosphorous was demonstrated. The experiments indicate, however, that the value of manure is measured by the nitrogen and mineral elements contained, that the chief function of its organic matter content is to serve as a carrier for these elements, and that if it is so managed as to release these elements before it goes to the field its value is very materially reduced.

The Formation of Nitrates in a Soil Following the Growth of Red Clover and of Timothy.—LYON, T. L., BIZZELL, J. A., and WILSON, B. D., in *Soil Science*, Vol. 9, No. 1, pp. 53-64. Baltimore, Md., January, 1920.

Twelve cylinders capable of being leached were filled with a soil of medium fertility and good drainage qualities. The soil was abundantly limed and fertilized with acid phosphate, muriate of potash and dried blood. Six cylinders were planted to timothy and six to red clover. The soil of all cans was inoculated with *B. radicola* from clover nodules.

During the time the timothy and clover were growing the soil was leached with dis-

tilled water from time to time. Nitrogen was determined in the drainage water and in the crops of timothy and clover. After these crops were removed the soil was allowed to remain in fallow for a month, leached, and nitrogen determined in the drainage. Of the cylinders on which timothy had been grown two were planted to oats, two to maize and two kept free of vegetation. The clover cylinders were treated in the same way. All were leached from time to time and nitrogen determined in the drainage water and also in the crops.

There was little difference in the quantities of nitrogen leached from the timothy soil and clover soil during the time these two crops were growing on them. There was about six times as much nitrogen leached from the clover soil during the month that both soils stood fallow after the timothy and clover crops had been removed. There was only about twice as much nitrogen leached from the fallow clover soil as from the timothy soil during the next five months. At the end of this period the rate of nitrate production in the clover soil was a little greater than in the timothy soil. The crops of oats and maize following clover were larger and contained more nitrogen than did those following timothy.

The experiment taken as a whole shows that under the same conditions of soil and treatment clover caused a greater production of available nitrogen than did timothy. This effect is shown in the nitrate content of the drainage water and the total nitrogen content of the oats and maize. Whether the clover stimulated the nitrification process or whether it contributed easily nitrifiable material is not apparent from the data. If the greater production of nitrates in the clover soil was due to the decomposition of the residue of that crop it appears that a portion of this residue is more easily nitrifiable than dried blood and that it constitutes only a small part of the entire residue of the clover crop.

The Action of Potash By-Products on Soil and Plants.—NOLTE, O., in *Landwirtschaftliche Jahrbucher*, Vol. 51, pp. 563-672. Berlin, 1918.

This report shows that by-product potash first increased crop yield on rich soil and then decreased it, the injury being greater the more deficient the soil was in nutritive constituents. Heavy fertilization decreased the injury caused by by-product potash, but did not entirely remove it.

No hindrance to assimilation of nutritive constituents resulted, but in fact a small increase was noted, especially in the case of lime and phosphoric acid. It is considered probable that ash constituents of plants are generally increased, but a content of 1 per cent of magnesia in the dry matter of plants was not reached. The assimilation of sodium was decreased by potash waste

liquors in spite of their high salt content, and in soil there was an active exchange of bases resulting in the formation of insoluble compounds of nutritive constituents.

The leaching out of the soil of nitrogen and phosphoric acid was apparently decreased by potash by-products, and poor soils accumulated potash. The reduction in lime content of the soil was the most important occurrence, while the magnesia remained in the soil. The injurious action of the potash by-products in the first two years is attributed mainly to the poisonous effect of a high concentration of magnesium chloride. Potash by-products also reduced the water assimilating powers of plants. Raw potash salts gave results similar to the by-products in that the use of water by plants was decreased.

The Best Fertilizers for Potatoes.—HASKELL, S. B., in the *Potato Magazine*, reprinted in the *American Fertilizer*, Philadelphia, April 24, 1920.

Three only of the thirteen plant-foods necessary to the growth of the potato are ordinarily lacking in the soil. They are ammonia, the stem and stock producer; phosphoric acid, which in available form induces a good root growth in early spring and later hastens maturity; and potash, which influences the starch content and produces big yields.

When ammonia is present in sufficient quantity we always get a good vigorous growth of tops. A deficient supply is indicated by weak top growth and a rather sickly, yellowish colour of the leaves, instead of the full, healthy green colour indicative of vigour.

The ammonia needed by the potato crop may be furnished in several ways. The soil itself furnishes some for a time, but, in general, the older the soil, the less the supply of this plant food. Clover sod turned under, or a leguminous green manure turned under, furnishes some, but just how much is difficult to say. Much depends on conditions. Manure if applied may furnish sufficient ammonia for the growth of the crop. Typically, however, the use of ammonia in potato fertilizer is necessary to most profitable production, almost regardless of the farm practices under which this crop is grown. It must always be remembered that the root system of the potato is relatively weak. It cannot rustle for unavailable plant-food as can rye and buckwheat or similar crops. Its energies must go toward laying up starch in the tuber, instead of toward foraging for plant food.

Phosphoric acid is especially valuable in hastening the maturity of the potato crop and in giving it a quick start. In cold sections the early maturity is an essential factor. The soil is particularly deficient in phosphoric acid. Often it is the lack of this element alone which limits the size of the crops. Manure applied to the soil will not

remedy its deficiency of phosphoric acid, for it is itself lacking in this element. This accounts for the high proportion of phosphoric acid recommended in potato fertilizers.

The potash needed may be supplied either by the soil, by manure or by fertilizer. There are still some soils, particularly in the Far West, that are so rich in natural potash that the addition even to the potato crop does not pay. Here, again, however, practice the country over indicates that at least some potash should be included in practically all fertilizers for potatoes.

Almost universally the potato crop responds to the use of fertilizer potash. Some say that this is because the potato is a great starch producer and must have potash in building up this most important of human and animal nutrients. Others say that it is because potato roots are poor foragers and cannot take up the cruder forms of potash present in all soils. After all, the precise reason makes little difference. The main thing, from the practical standpoint, is that on nearly all soils, potash increases the potato crop sufficiently to more than pay its cost.

Aroostook County, Maine, with its fertilizer tonnage of about 100,000 annually, uses normally not more than three or four different grades of fertilizer. "4-8-6," that is a fertilizer with 4 per cent of ammonia, 8 per cent of available phosphoric acid and 6 per cent of potash, was popular before the war, and is now back in favour, despite the cost and scarcity of potash. "4-8-4" is used by some farmers, apparently with good results at least equal to those obtained on the higher potash goods. It is likely that the old "5-8-7" will come back strong in days to come, for with a short growing season, Maine potatoes must be fertilized as much as are the early potatoes of the eastern shore of Virginia.

It must always be remembered that these suggestions are based on growing potatoes as they should be grown—in a good rotation containing clover. Even a heavy application of any one of the foregoing analyses fails to furnish sufficient ammonia to grow what we call a heavy acre yield; part of this needed ammonia must be obtained either from barnyard manure or a good, heavy clover sod turned under. For a time, naturally, any new soil will furnish sufficient of this plant food to the crop, but in all the great potato counties of the country, excepting only those in irrigated regions of the West, this time is past. Clover nitrogen and manure nitrogen must now be supplemented with fertilizer nitrogen.

Fertilizers for Strawberries.—*The American Fertilizer*, Philadelphia, April 24, 1920.

Strawberries do not remove a large amount of plant food from the soil, but they do require a rich soil, and respond well to fertilization. This for the reason that the roots are not

long and feed in a space not much larger than that covered by the leaves, and also because they develop a large crop in a short period of time. Many growers feel that stable manure is necessary in growing strawberries, while others get just as good results by planting on soil which contains a large amount of organic matter derived from green manuring crops or decaying clover sod.

A general formula for commercial use quite commonly recommended in districts growing strawberries for market is 1,000 pounds per acre of a 4-10-2 fertilizer. Formerly more potash was sometimes used. It is essential that any fertilizer be applied early in the spring and that at least a part of it be quickly available.

A Survey of the Fertilizer Industry.—GOLDENWEISER, E. A., in *United States Department of Agriculture, Bulletin* 798, pp. 29. Washington, D.C., 1919.

This is a report of a survey on the production and marketing of fertilizers and fertilizer materials in the United States during the years 1917 and 1918.

The principal materials used during the two years in mixed fertilizers were acid phosphate, potash-bearing materials, and nitrogenous materials. A certain quantity of agricultural lime, salt, and filler was also reported. The companies used more than 2,200,000 tons of phosphate rock in the manufacture of acid phosphate during 1917, as compared with only 72,000 tons of steamed ground bone, and 32,000 tons of raw ground bone with small quantities of other phosphatic materials. The quantity of sulphuric acid used is approximately the same as that of the phosphorous-bearing materials.

The total production of phosphate rock amounted to 2,696,000 short tons in 1918 compared with 2,588,000 short tons in 1917. The greatest production was of Florida land pebble (2,142,000 tons), which alone comprised about four-fifths of the entire output. Tennessee brown rock, of which 378,000 tons were mined, is next in importance. The production of but two of the other kinds amounted to 50,000 tons. The great mass of the rock marketed during the period was in the form of Florida land pebble, of which 774,000 tons were marketed during the first six months of 1918, and the next most important quantity was of Tennessee brown rock.

The total amount of ammonia used during 1917 was more than 18,600,000 units of 20 lbs., and the total amount used during 1918 exceeded 15,000,000 units. The principal source of ammonia during both years was sodium nitrate, nearly 30 per cent of the ammonia being derived from that one source. The second source of importance was ammonium sulphate, from which about one-sixth of the ammonia was derived. Among the organic sources of ammonia, tankage and cottonseed meal are by far the

most important. The proportion of ammonia derived from animal tankage of high and of low grade was less in 1918 than in 1917, owing, probably, to the great demand for tankage as feed. The proportion derived from cottonseed meal increased from 13.8 per cent in 1917 to 15.3 per cent in 1918. Nearly four-fifths of the ammonia in fertilizers is thus derived from the two great mineral sources, sodium nitrate and ammonium sulphate, together with the two principal organic sources, tankage and cottonseed meal.

The total potash produced during 1918 including estimates for the last three months, was 53,500 tons. More than four-fifths of the potash is derived from mineral sources, and among these sources lake brines alone account for considerably over two-thirds of the potash. The next most important source in 1918 was kelp, the giant seaweed of the Pacific coast, from which over 5,000 tons of K_2O was derived during the year. Some of the other important sources are alunite, beet-sugar factory waste, cement dust, and tobacco waste. The quantity of mixed fertilizer produced was 4,433,000 tons in 1917 and 4,958,000 tons during 1918.

A table shows that 218 grades were manufactured in quantities of 1,000 tons or more. These 218 grades comprised over 95 per cent of the total mixed fertilizer produced, while the remainder was distributed in small quantities among 724 grades. Data are also included on stocks of fertilizer materials on hand.

Why Higher Wheat Yields are Possible.—

BROWN, J. C., (Vice-Principal Harper Adams Agricultural College), in *The Miller's Gazette*, Vol. 6, No. 23, pp. 275-276. London, June 9, 1920.

High yield is the chief concern of the wheat grower, and whatever importance may be attached to such factors as quality of grain, strength of straw, etc., it is the prospect of securing large yields of grain which determines the nature of his practice.

The yields obtained at the present time from the wheat crop seem to have made less upward progress than might have been expected from the efforts which have been made to improve the crop and its cultivation. It would seem that if the crop is to maintain its position in the agriculture of this country the average yield must be increased; already there is a great falling away from the area sown with wheat during the war years. It is thus of first-rate importance that the possibilities of this all-important crop should be thoroughly investigated.

Compared with what is theoretically possible, the wheat yields of the world are surprisingly low, even the Danish average yield of 36 bushels per acre leaves much room for improvement. This country grows only an average of 32 bushels per acre on its select wheat land, while the average yield of

the United States is less than half that amount, and Canada's yield per acre is only slightly higher than that of the States.

No doubt the yield per acre of wheat in this country is considerably higher than at any time previous to the 19th century, but it is doubtful if it has advanced to any considerable extent since the middle of that century. It is therefore impossible to be satisfied with the yield now being obtained, especially in view of the fact that it does not seem to be making any upward progress.

Great advance has been made with other crops, such as sugar-beet, which now yields double the amount of sugar per acre obtained fifty years ago while the introduction of Abundance oat greatly increased the yield of the oat crop. Even Denmark has only slightly improved the wheat yield during the last quarter of a century, although it must be remembered in that country wheat is grown over a greater proportion of the land than in Britain; weaker land, therefore, must be employed for the crop.

With this lack of progress before us it is highly important to inquire whether we have reached the highest point in wheat yields, and if not, why no further progress is being made.

Yield is governed by two factors; the number of ears on the ground, and the size of the ears. These factors are naturally antagonistic, as the number of ears increase, the size decreases; to secure really big yields the two things must be obtained in the same crop. An examination of an average crop of wheat reveals the fact that the average wheat ear is very small, containing rarely more than 30 grains, and the crop will not be very dense in the ground.

A good crop of wheat will give about 36 plants to the square foot, and if this number be taken as the basis of calculation the average ear in a 32-bushel crop is 13 grains. The wheat ear is, however, capable of holding about 120 grains. As conditions improve, the number of grains increases, but in every wheat ear, grown under field conditions, a high percentage of sterile flowers are found. These are found chiefly in the centre of the spikelets, and often the lowest spikelet of the ear is completely sterile. This spikelet is a useful indicator in estimating the yield of a crop of wheat, as in a good crop the lowest spikelet of the ear is fertile, while in a poor crop it is infertile. The most fertile portion of the wheat ear is in the middle; from the middle upward and downward fertility decreases.

To bring about an increase in the wheat yield it is obvious that greater ear fertility must be obtained, while the maximum density of crop is retained. Light and air play an important part in the development of the wheat ear, as may be seen from the large ears which are always found in the outside rows of a crop.

Tull, and Smith of Lois Weedon, tried to increase yields by developing large wheat ears through giving wide spaces between the rows. This system failed because it reduced the plants per acre too greatly, and although the ears are increased in size, the increase is not sufficient to overcome the loss in number of plants. Increasing the width of the drills reduces the crop.

Major Hallet tried to improve the wheat plant by increasing the size of ear, while other workers concentrated on tillering and density of growth; in both cases their efforts failed to give high yielding strains.

A study of the wheat crop, however, impels the belief that further progress is possible by increasing the fertility of the ear and maintaining the density of the crop. The largest wheat ear shown in the photograph in the original article was taken from a small plot in which it was not much larger than the average. It contains 108 grains fully developed, but even in this ear there are many undeveloped seeds. A crop of similar ears at the rate of 36 to the square foot would yield 260 bushels of grain per acre. Even if Mr. Alfred Amos's crop of 96 bushels per acre only gives average ears of 40 grains, or about one-third of what the wheat ear is capable of. The highest yield of wheat authentically recorded is 117 bushels per acre, less than half of what is theoretically possible.

Very heavy crops are comparatively rare, and it is not with the very exceptional yields that the average farmer is concerned, but rather with the improvement of the yield on the weaker land; even the adding of a single grain per ear is an important matter when taken over the whole country.

There appears to be a curious limiting factor to yield on certain soils. Thus at Rothamsted it has been found impossible to raise the yield of wheat above 45 bushels, even with the most scientific treatment. Artificial improvement of the soil will not, then, always secure high yields, although manuring will often give very profitable increases. It cannot be denied that there is great opportunity for improvement in the yield of the wheat crop, and it is therefore important to examine the various possible courses by which the crop may be increased.

Cultivation is of first importance, and it is possible that better crops could be obtained by attention to this point alone. Plough early, and sow while the summer warmth is still in the soil, is a golden rule. The agriculturists of by-gone times believed strongly in sowing on a stale furrow. The difference in germination of the seed sown on newly ploughed and stale land is quite remarkable. A variety like Iron will sometimes not germinate more than 50 per cent if sown on newly-ploughed land; the seeds sprout, but fail to reach the surface.

To test this point my colleague, Mr. Garnett, sowed wheat seed in soil taken from newly-ploughed and from stale soil, and

the difference in growth of the seeding plant was clearly marked. In an American experiment 31.3 bushels per acre were obtained from land ploughed in July, and only 15.3 bushels from newly-ploughed land, both plots being sown in September.

In the cultivation of the wheat crop no benefit is obtained from such practices as sub-soiling; in this respect it differs entirely from root crops. Wheat demands a firm sub-soil and lumpy surface soil, which allows water to pass through easily.

The yield of the wheat crop is determined largely by the manner in which it weathers the winter; varieties such as Iron winter badly, and are consequently too thin in the spring to give the density of crop required to produce a high yield. Early sowing is of great importance, because the plants become well established before the adverse weather sets in.

The attacks of ground insects are undoubtedly among the chief factors limiting wheat yields and are most difficult to combat. If the vigour of the plant is sapped by insect attack it cannot give an abundant yield. The advantage of early sowing is shown by the following results of an experiment carried out at the Harper Adams Agricultural College:—

Sown September 30th, 34 bushels of grain and 43 cwt. of straw.

Sown October 13th, 30.16 bushels of grain and 39 cwt. of straw.

Sown November 6th 23.96 bushels of grain and 36 cwt. of straw.

The benefit of early sowing can be still further extended by sowing the autumn wheat with an oat crop in the spring. Many varieties of wheat are biennial in character, and if sown with oats in the spring they simply form vegetative growth in the first year and produce seed the year following. To obtain a full crop it is necessary to graze down the plant in the autumn after the oat crop is removed, so as to make the roots form entirely new stems in the second year. A wheat crop raised in this manner is exceptionally vigorous and is capable of resisting conditions which would destroy an autumn-sown crop.

Greater use could be made of artificial manures, especially nitrogenous manures, than is being made at the present time. The wheat plant readily responds to quick-acting nitrogenous manures, of which sulphate of ammonia is the most suitable, because it increases the yield of grain rather than the straw. Results obtained at the Harper Adams College show the marked effect this manure may have in improving the yield of wheat. The application of 1 cwt. of sulphate of ammonia per acre applied in February on land which had been dressed before ploughing with farmyard manure raised the yield from 43½ on the no sulphate of ammonia plot to 71½ bushels.

The time of application is of great importance, as, if the manure is applied too early or too late, it will have comparatively little effect. No date can be given which will be correct for all seasons and districts; guidance must be sought from the plant itself. Sulphate of ammonia will have its greatest effect if applied at the time the plant is tillering. Nitrogenous manures applied at this period in the life of the plant greatly increase the tillering process, which gives a denser crop and consequently more ears per acre.

If the crop is well harrowed at the time of application of the nitrogenous manure a still greater density of crop will be obtained; it has been asserted that it is possible to increase the yield of wheat by a sack per acre by hoeing alone. This is probably true because of the active tillering which results.

The effect can be watched by experimenting with a single plant. If a wheat plant be separated at the tillering period and frequently covered lightly with soil and sprinkled with sulphate of ammonia, it will continue to tiller and spread out to a great size, and if this process is continued throughout the summer the plant can be made to spend all its energies in producing vegetative parts. Harrowing in the spring and dressing with nitrogenous manures is a comparable process, except that it is arrested in time to allow the stools to produce ears.

Farmyard manure is most effective in increasing the wheat crop—applied as a top dressing or ploughed in. The combination of farmyard manure with nitrogenous manures as a top dressing is the best practice.

The above suggestions do not exhaust the possibilities of increasing the yield of the wheat crop. As has been previously noted, the wheat ear is capable of holding about 120 grains, but the average ear obtained in Britain only contains about 13 grains. The addition of a single grain per ear would mean a great increase in the total grain yield of the country. It is to the introduction of improved varieties that we must look for the making of the wheat ear more prolific.

Surprisingly little improvement has been made in the wheat plant since the middle of the 19th century. Squarehead's Master and Browick Grey Chaff still hold their own in many districts against all newcomers, yet in Canada and the United States Marquis wheat, introduced in 1903, drove out all other varieties over extensive regions, and is said to have increased the yield of Canada and several States of America by millions of bushels per annum.

It is the writer's opinion that to obtain wheats which will give better yields than the established varieties, the peculiarities of each district must be studied. A careful examination of the wheat crop in England shows that it behaves quite differently in different districts, sometimes in different parts of the same field. Little Joss, for example, in the Eastern Counties has

proved superior in yielding power to the common varieties, while Yeoman appears to be particularly well suited to Kent; neither is outstanding in Shropshire but Iron, when it survives the winter in sufficient abundance, will give at least a sack per acre more than any other variety at present in cultivation. The great weakness of Iron wheat is that it is a bad starter, and it is particularly necessary that it should be sown on a stale furrow.

The fact remains that no wheat variety has yet appeared which possesses the superiority over its predecessors that the Abundance oat has over the Potato variety; since its introduction this oat must have added to the income from the land very large sums indeed. It is to the further improvement of the wheat plant that we must largely look for better yields. A better variety, or a variety more suited to the particular conditions, might raise the Rothamsted 45 bushels to the level of the Kentish 96 bushels.

A more widespread interest in the subject among farmers themselves is desirable, for it should be remembered that the first improver of cereals, whose work is recorded, was Patrick Sheriff, a practical farmer, and that the Potato oat was discovered by a female labourer, while the Sandy oat, which is still valuable after being in cultivation a hundred years, was found growing on a rubbish heap by a Scottish herd boy.

Plant improvement is really the quest of the giant among its fellows. The discovery of Mendel's law of inheritance has added comparatively little to the possibilities of improvement of crop yields; at the best it has shortened the work. After 20 years no phenomenal increases in yielding capacity have been obtained as the result of its application. The super-plant must first be discovered, and what is required is a great search for such plants among pure strains and hybrids.

Herodotus, writing 2,300 years ago, speaks of wheat yielding 200-fold; the average yield of wheat in Modern England is barely 12-fold.

Mushrooms.—WHITE, T. N., in *Maryland Experiment Station Bulletin* 232, pp. 67-85. College Park, Md., 1919.

The results are given of studies of several phases of mushroom growing that have been conducted at the station for a number of years by P. M. Novik, C. P. Close, and later by the author. Cultural directions for growing mushrooms are included and a brief list of references is given.

Differences in the yields of several varieties of mushrooms tested appeared to vary according to the condition under which they were grown. Eureka and Delaware, for example, gave the best results under cold and moist conditions, whereas Bohemia did the best under dry, warm conditions. Cover-

ing the beds with straw held the moisture more uniformly and resulted in a greatly increased production. A rich loam soil when used for covering or "casing" the beds after spawning gave better results than a poor, sandy, or clay soil. Larger mushrooms and more in weight per square foot were produced in an unheated vault than in a heated shed, but production ceased in the vault temporarily when the outside weather became severely cold, whereas it continued throughout the winter in the heated shed. Production ceased one month earlier in the spring in the heated shed than in the unheated vault.

Manure from the horse barn produced nearly double the quantity of mushrooms as that from the cow barn. Loam mixed with the manure caused an increase in the yield and prolonged production. Loam also decreased the heat from fermentation when the beds were first made up. Manure from mules fed on molasses feed proved to be detrimental to mushroom production. When wheat bran and whole corn were fed with alfalfa hay the production of mushrooms was double that from beds made up with manure from teams that were fed the same grain ration with timothy hay.

Under cool conditions bottom heat may be effective in causing the spawn to grow and produce better, but if the mushroom house can be maintained at the right temperature bottom heat is unnecessary. After fermentation of the manure stops the temperature of the bed will fluctuate with that of the house, thus indicating the necessity of having the mushroom house properly warmed and insulated.

Influence of Sodium Chloride on Trees.—

RUDOLFS, W., in *Soil Science*, Vol. 8, No. 5, pp. 397-425. Baltimore, Md., November, 1919.

Experiments were made upon 100 trees (oak, birch and maple) with sodium chloride; applications ranging from 1 to 10 pounds were made to individual trees.

Some trees showed injury as early as 6 weeks after the application, while after 10 weeks a number of trees were seriously injured and some dying. The leaves of these trees turned brown and curled. An examination made at the height of the season showed some marked external changes. Smaller applications of salt apparently acted as a fertilizer. The trees treated with a small application were making a vigorous growth, the leaves becoming very large and thick, having a dark blue-green colour and glossy surface. Others elongated their branches making the distance between the leaves unusually wide. The first signs of toxicity appeared usually at the edges of the leaves at the extreme end of the tracheids, or in the primary and secondary veins. The injury spread gradually until the leaves had

a spotted sickly appearance. After some time the leaves dried out with a rubber-like consistency. These leaves kept their flat and glossy surface and dropped from the branches. If the injury started at the edges of the leaves, they gradually turned brown, curled, but remained on the trees. When the injury appeared in the veins first a beautiful yellow-coloured lace-work seemed to cover the under side of the leaves.

Quite frequently the trees made an effort to survive by sending forth tiny new branches from latent buds. These small branches in nearly all cases turned black-brown and dried out. Most of the trees which were given smaller applications made a secondary growth long before the untreated trees standing nearby.

Of the trees experimented with, the maple is the most easily affected by sodium chloride, followed by the birch and finally by the oaks.

The rate of injury seems to be dependent upon the height of the trees. The higher trees were more resistant than the lower ones of the same species.

It is possible that the chlorine increases the acidity in the plant cell, accelerating or harming the vital activities, according to the amount employed.

The fact that a small amount of sodium chloride acts as a fertilizer or as a stimulant for trees and shrubs, may lead to the more general use of common rock salt for certain plants, while the toxic effects of the larger applications might be employed in the eradication of weeds and the clearing of farm land from live stumps.

Climatic Cycles and Tree Growth: A Study of the Annual Rings of Trees in Relation to Climate and Solar Activity.—DOUGLAS, A. E., in *Carnegie Institute, Pub.* 289, pp. 127. Washington, 1919.

The original plan of the study was based on three fundamental propositions: (1) The rings of trees measure the growth; (2) growth depends largely upon the amount of moisture, especially in a climate where the quantity of moisture is limited; (3) in such countries, therefore, the rings are likely to form a measure of precipitation. Relationship to temperature and other weather elements may be very important, but precipitation was thought to be the controlling factor in the region of limited rainfall in which the study was begun. Conifers were selected for the study because of the great areas they cover, the great variety of climates they endure, and especially because of the prominence of their rings. The chief trees used, with approximate number of rings measured in each, are the yellow pine (*Pinus ponderosa*) about 14,000; Scotch pine (*P. silvestris*) about 9,000; hemlock (*Tsuga canadensis*) 2,500; Douglas fir (*pseudotsuga mucronata*) 2,500; Sequoia (*Sequoia*

gigantea) 47,000. The annual growth of trees in the region of Flagstaff, Ariz., was compared with rainfall at that place during 8 to 10 years. Sections of trees from various parts of the United States and other countries were studied and the results correlated with rainfall and sunspots by special methods developed by the author. The conclusions reached are summarized as follows:

The variations in the annual rings of individual trees over considerable areas exhibit such uniformity that the same rings can be identified in nearly every tree and the dates of their formation established with practical certainty. In dry climates the ring thicknesses are proportional to the rainfall with an accuracy of 70 per cent in recent years, and this accuracy presumably extends over centuries; an empirical formula can be made to express still more closely this relationship between tree-growth and rainfall; the tree records, therefore, give us reliable indications of climatic cycles and of past climatic conditions.

The tree's year for such records begins in the autumn. Double rings are caused by spring drought and are indicative of the distribution of rainfall throughout the year.

Tree records may be used in the intensive study of the location of homogeneous meteorological conditions and in outlining meteorological districts. Certain areas of wet-climate trees in northern Europe give an admirable record of the sunspot numbers and some American wet-climate trees give a similar record, but with their maxima one to three years in advance of the solar maxima. It is possible to identify living trees giving this remarkable record and to ascertain the exact conditions under which they grow. Practically all the groups of trees investigated show the sunspot cycle or its multiples; the solar cycle becomes more certain and accurate as the area of homogenous region increases or the time of a tree record extends farther back; this suggests the possibility of determining the climatic and vegetational reaction to the solar cycle in different parts of the world. A most suggestive correlation exists in the dates of maxima and minima found in tree-growth, rainfall, temperature, and solar phenomena. The prevalence of the solar cycle or its multiples, the greater accuracy as area or time are extended, and their correlation in dates point towards a physical connection between solar activity and terrestrial weather. The tree curves indicate a complex combination of short periods including a prominent cycle of about two years. An instrument has been constructed which promises special facility in the analysis of such periods.

It was incidentally observed in this study that the response in tree growth to rainfall was more prompt on well-drained limestone soil than on more compact, less well-drained soils of volcanic origin.

LIVE STOCK AND BREEDING

Effect of Drugs on Milk and Fat Production.—Hays, F. A., Merton, G. T., in *Journal of Agricultural Research*, Vol. XIX, No. 3, pp. 123-130. Washington, D.C., May 1, 1920.

The opinion that milk production and butter-fat yield can be influenced by the use of drugs is widespread among dairymen. The authors carried out an experiment at the Delaware Agricultural Experiment Station from April 14th to July 11th, 1919, with the following objects: To determine the effect of various drugs on the butter-fat test of milking cows; to study the effect on the total fat yield of producing cows; to determine whether drugs have an effect on the health or on total milk production. The method of the experiment is described. The following drugs were used:

1. Food tonic consisting of 100 pounds of oil meal, 5 lbs. saltpeter, 5 lbs. epsom salts, 5 pounds gentian, 5 pounds fenugreek, 8 pounds powdered charcoal, and 5 pounds sulphur, fed at the rate of 2 ounces daily per cow in two feeds.

2. Air-slaked lime, fed at the rate of 2 ounces daily per cow in two feeds.

3. Fowler's solution of arsenic, fed at the rate of 2 fluid ounces daily per cow in two feeds.

4. Gentian fed at the rate of 2 ounces daily per cow in two feeds.

5. Tonic mixture consisting of the following: 3 ounces black sulphide of antimony; 1½ ounces sulphur; 5 ounces each of fennel, caraway, and juniper berries, 1 pound common salt, fed at the rate of 2 ounces daily per cow in two feeds.

6. One gr. physotigmine sulphate injected hypodermically daily per cow, ½ grain in two doses.

7. Sodium bicarbonate, fed at the rate of 2 ounces daily per cow in two feeds.

8. Ginger, fed at the rate of 2 ounces daily per cow in two feeds.

The results of the experiment are given in a series of graphs, and may be summed up as follows:

(1) A study of individual records and average records does not indicate that drugs have a very pronounced effect on the production of the dairy cow.

(2) Air-slaked lime fed in 2-ounce doses daily may possibly increase milk production and total fat yield.

(3) No other drug or mixture tested proved to be of value to increase production.

(4) Results do not indicate that the difference in character of milk of Holstein and Guernsey cows has any relation to their manner of reaction to drugs.

FARM ENGINEERING

International Standardization of Electrical Machinery.—*Science and Industry*, Vol. 2, No. 2, p. 72, Melbourne, N.S.W., Feb., 1920.

A great deal of valuable work in the direction of the international standardization of electrical machinery, plant, and equipment has been carried out by the International Electro-technical Commission. Although it has maintained its organization intact, that body did not hold any meetings during the war. At the first meeting after the war, held at London in October, 1919, it was decided to re-appoint the various committees which were at work before the war and to appoint some additional committees. There are now eight committees at work, viz.: (a) Nomenclature; (b) Rating of Electrical Machinery; (c) Symbols; (d) Nomenclature of Prime Movers for Electrical Plant; (e) Aluminium, standard of resistance; (f) Screw Lamp Caps and Lamp Holders, interchangeability; (g) Charging Plugs for Electrical Vehicles, interchangeability; (h) Pressures for Distribution. A meeting of the Commission will be held this year in the United States of America.

Kerosene as a Fuel for Farm Tractors.—SECOR, J. A., in *Transactions of the American Society of Agricultural Engineers*, Vol. 12, pp. 171-187. Columbus, Ohio, 1918.

This is a summary of data from several sources from which it is concluded that, from the strictly commercial viewpoint, the oil tractor has surpassed the gasolene and steam tractors.

The fact that kerosene is practically nonvolatile at atmospheric temperature is advantageous rather than detrimental to its use as a fuel for the farm tractor. Experience with various methods of regulating the speed and power of farm tractors demonstrates that quantity governing has practical advantages over existing methods of regulation.

The only feasible method of using kerosene in an engine when controlling factors of combustion are variable is to readjust the temperature of the combustion chamber and the fuel to air ratio of the fuel mixture to suit each new set of conditions caused by each change in compression. In order for the quality, quantity, and combustion temperature of the fuel mixtures to be automatically readjusted in co-ordination under a varying load, these readjustments must be subject to a common unitary control; therefore, ordinary functions of the speed-controlling governor should be increased so as to include such triple automatic co-ordinate control. The addition of water to the fuel mixture in automatically varying quantities under governor control is the most efficient means for regulating the internal temperatures at the higher loads.

Heat Sterilization for all Parts of Milking Machines.—HART, Geo. H., and STABLER, W. H., in *Journal of Dairy Science*, Vol. 3, No. 1, pp. 33-50. Baltimore, January, 1920.

The last twenty-five years have seen marked improvements in the construction of milking machines. Today a number of makes have been sufficiently perfected and are milking cows so successfully that they may be considered a practical success from the mechanical standpoint.

Labour difficulties due to the war gave a great impetus to the installation of milking machines. Today the capital invested in the manufacturing plants as well as in machines distributed on dairy farms is so large that investigation into the difficulties encountered in their operation is greatly needed.

The sanitary side of milking machine operation was investigated early in their development, at which time not nearly so much was known about the origin of the bacterial flora in milk as at present. Consequently it must be recognized that some of the early bacteriological work on this subject is no longer of any value in the light of our present day knowledge.

The authors give a review of previous investigations on the subject, then discuss their own experiments. Their conclusions are:

Heat sterilization is the only way to successfully sterilize milking machine rubber parts under ordinary ranch conditions. It is a practical procedure from the time involved and the wear and tear on parts. Where it has been regularly done no increased trouble with mammitis has ever developed as a result of installing machines. By this means as low a bacterial count milk can be produced with milking machines as by hand milking. Milk can be produced to meet any reasonable bacterial grading system. No chemical solution has been found to successfully accomplish these results under practical conditions. Its general application will greatly reduce the discarding of milking machines after they have been installed.

AGRICULTURAL INDUSTRIES

780.—**Influence of Humidity Upon the Strength and the Elasticity of Wool Fibre.**—HARDY, J. T., in the *Journal of Agricultural Research*, Vol. XIV, No. 8, pp. 285-295. Bibliography of 8 publications. Washington, August 19, 1918.

Though it has been known for many years that wool absorbs the moisture of the air, the first investigations into this subject were made in 1893 by Schloesing, who studied the ratio between the moisture content of clean wool and the atmospheric moisture. The results he obtained were fully confirmed by Hartshorne in 1905. It was Hartshorne who formulated the "laws of regain (by the

absorption of moisture) in cotton and worsted." Taking these as a basis he drew up tables showing the moisture content of wool for a large series of variations in the moisture conditions and temperature of the air. These tables show the great sensitiveness with which wool replies to changes in the relative moisture of the air, and by their means it is easy to find the moisture content of wool when the relative moisture of the air is known.

The effect of moisture on the strength and elongation of wool yarns and fabrics was studied by Barker, Barbrick and Pickles who, in their study on worsted, found that when the moisture content passed from absolute dryness to saturation there was a decrease in the strength but an increase in the elongation percentage. They also found that when similar types of wool were tested in a room with 92% of moisture, then in another with 76% the strength was increased and the elongation decreased. They further discovered that the strength and elongation coefficient of yarns and fabrics made of cotton increased with the moisture of the surrounding atmosphere.

Lewis made experiments with wool yarns and worsted similar to those of Barker and his collaborators under controlled conditions of moisture and temperature, using five different percentages of moisture (from 45 to 85%). He found an increase of 16% in the textile strength of cotton and a decrease of 18% in the textile strength of worsted for a 40% rise in the relative moisture of the air.

Investigations made in 1911 at the Wyoming Agricultural Station under the direction of Hill showed that the dry fibre of wool is stronger than the wet fibre, and that at a moisture content of approximately 15% wool fibre is stronger than at 35%.

The author continued these investigations working under temperature and moisture conditions controlled automatically by means of electric connections between a thermograph and a hydrograph indicator working a series of lamps and two water atomizers respectively. He worked at a temperature of 70° F. and 40, 50, 60, 70, and 80% of relative moisture. The results obtained for the breaking coefficient, tensile strength, diameter and elasticity of the wool fibres at different degrees of moisture are set out in a table. Briefly summarized they are as follows:—

The determination of the breaking coefficient as a measure of the strength of wool does not give satisfactory results on account of the great variations in the size of each fibre. It has not been possible to fix a correction for the diameter of the fibres microscopically. On the other hand, a micrometer put in the place of the lower jaw of the testing apparatus proved an excellent means of making this correction and reducing the breaking strength to the tensile strength or unit stress. A comparison between the tensile strength at five degrees of relative

moisture (40, 50, 60, 70 and 80%) showed the tensile strength of the raw wool of four different breeds of sheep to decrease with the rise in humidity.

Effect of Sheep Dips on Wool.—*Science and Industry*, Vol. 2, No. 2, p. 77, Melbourne, N.S.W., February, 1920.

The effect of sheep dips on wool was the subject of an interesting lecture before the Leeds University Textile Association by Dr. Sydney Williamson, of the Cooper Research Institute. The whole discussion as to the effects of dips on wool, said Dr. Williamson, had unfortunately centred mostly on the lime and sulphur dip, the one which the farmer himself made for the sake of cheapness. That dip was opposed by the manufacturers of the proprietary dips. In spite of much research for authentic evidence as to the injurious effects of dip upon wool, he had come across nothing which could be regarded as conclusive. He expressed the opinion that nicotine in dip was not injurious so long as pure nicotine was used. Carbolic acids, as a rule, were only injurious if they contained an excess of alkali, which tended to disintegrate the fibres. If a farmer used impure tar oil in dipping, he might get wool which, after scouring, would turn almost brick-red in colour, but such instances were rare. With regard to the lime and sulphur dip, he had seen a great deal of wool which had been injured. It had become harsh, and had lost its lustre, a condition which was probably due to the deposition of lime, which formed salts in contact with the fats in the wool. These lime salts were probably deposited in the fibre, but he had never been able to prove it. Speaking in regard to arsenical dips, Dr. Williamson said they were not injurious unless an excess of alkali had been used in making the arsenic soluble. On the whole, he was inclined to believe the arsenical dip improved the wool, but it was exceedingly difficult to prove.

PLANT DISEASES

Frost Necrosis of Potato Tubers.—JONES, L. R., MILLER, M., and BARLEY, E., in *Wisconsin Agricultural Experiment Station Research Bulletin* 46, pp. 46. Madison, Wis., 1919.

The authors have investigated the effect of low temperatures on potato tubers on account of their liability to injury during all stages of harvest, transportation, storage and delivery. Several forms of possible injury are recognized, and their symptoms contrasted with diseases of tubers the symptoms of which resemble those of frost necrosis.

In summarizing the results of their investigations, the authors state among other things that where tubers are frozen solid they immediately collapse upon thawing and because of their wet appearance are

easily detected. In case of mild exposure only a part of the tubers may be frozen and the rest appearing normal are considered satisfactory for storage, market, or seed purposes. However, if these tubers are cut open a certain proportion of them will show evidence of internal frost necrosis.

Three types of injury are recognized, ring necrosis, where there is discoloration of the vascular ring especially evident at the stem end when the tuber is cut crosswise; net necrosis, in which the vascular tissue, including the small thread-like phloem elements scattered throughout the pith and cortex, are darkened; and blotching, in which discoloured tissue in patches, usually having vascular elements as centres, is distributed irregularly throughout the tuber. Such internal freezing injuries are not ordinarily visible externally, even after long storage, but in white-skinned varieties they may show as darkened areas on the skin, and in prolonged dry storage frost necrotic tubers wilt faster than normal ones. The necrotic discolourations are said to develop promptly after freezing, passing from pink to dark brown or black and ordinarily undergoing little further change thereafter, even during long storage. Considerable difference was noted between individual tubers in susceptibility to frost injury even in the same lot of potatoes, but in general neither variety, size, maturity, nor relative turgidity of potato tubers influences to any marked degree the liability to injure nor the type of resistant frost necrosis.

In general, frost necrosis is said to appear in at least a portion of tubers which are subjected to a temperature of -10°C . (14°F .) for one hour, to -5° for two hours, or to -3° or slightly lower temperature for several hours. Sprouts have been found more resistant to freezing than the tubers from which they arose, but uninjured sprouts on necrotic tubers often do not outlive the germination period, probably due to extensive vascular injuries of the tuber.

Plants produced by the frost necrotic halves of experimental tubers grew more slowly than those from the control halves, but ultimately produced as large and healthy and as abundant a crop. Nothing was found to indicate the transmission of necrotic symptoms to the progeny of frost necrotic seed potatoes.

Effect of Wounds on Loss of Weight in Potatoes.—BUTLER, O., in *Journal of the American Society of Agronomy*, Vol. 11, No. 7, pp. 304-305. Lancaster, Pa., October, 1919.

Undamaged potatoes stored at from 8 to 10°C . (from 46 to 50°F .) for 111 days at the New Hampshire Experiment Station showed a loss in weight of from 6.23 to 9.21 per cent, as compared with a loss of from 9.08 to 11.81 per cent sustained by tubers which had been slightly injured. The ratio between

the loss of weight of the injured and uninjured tubers did not assume a constant value until after 79 days. Storing mutilated tubers at 68° F. effected a rapid healing of the wound with a consequent slight reduction in the loss of weight, the latter amounting to 11.25 per cent for wounded potatoes stored at 20° for 32 days and then stored for 79 days at from 8 to 10°.

The Dry Root Rot of the Bean.—BURKHOLDER, W. H., in *New York Cornell Agricultural Experiment Station*, Mem. 26, pp. 1003-1033. Ithaca, N.Y., 1919.

A description is given of the dry root rot of the beans caused by *Fusarium martii phaseoli*, n. form. As the common name indicates, the disease affects principally the underground parts of the plant, but portions above ground also show the effect of the fungus. The symptoms are described at length, and comparisons made with those of the black root rot of beans due to *Thielavia basicola* and of a *Rhizoctonia* blotch. The morphology, life history, pathogenicity, etc., of the organism are described at length.

The disease is known to have been present for some years, and together with other root diseases it has caused considerable loss. Special attention is called to control measures, which include rotation of crops, soil-treatment, and use of resistant varieties. Rotations, unless of quite lengthy duration, do not offer much promise of control. Soil treatments were not beneficial, and probably breeding resistant strains offers the best means of control.

INJURIOUS INSECTS

The Achemon Sphinx Moth.—NOUGARET, R. L., in *Monthly Bulletin, California Department of Agriculture*, Vol. VIII, No. 10, pp. 560-584. Sacramento, Cal., October, 1919.

Pholus achemon, Drury (grape-vine sphinx moth) occurs in all parts of the United States and Canada where grapes are grown, but outbreaks of this pest have not been reported outside California. Several cases of sudden severe infestations are described, in which grape-vines were completely defoliated. During these attacks attention was entirely given to controlling the pest until the larvæ were completely killed off, so that there was little possibility of investigations into the life-history. It is now known that the eggs are deposited singly on the upper surface of fully-developed leaves, never on the tender growing leaves of the shoots. The number of eggs laid by one female and the period of incubation have not been discovered. There are three larval stages, lasting on an average 7½ days, 7 days and 9 days respectively. During the whole larval period feeding continues voraciously, the leaves being entirely skeletonized. The vine frequently

puts forth a fresh growth of leaves within about a week or ten days, and this new growth can be hastened by irrigation, but in the meantime the development of the fruit has been arrested and the berries may shrivel and drop so that the crop is a total loss, and in any case they do not attain perfect maturity. When the larva is fully grown, it ceases feeding and drops or descends to the ground. It then burrows into the soil and after 5 or 6 days of this pre-pupal period, pupation begins. Apparently some moths emerge about one month later, but the majority remain in the ground until the following spring. There is therefore only one real generation in a year with a partial second. It also seems probable that a partial generation may precede the true one, from a few over-wintering pupæ. The larvæ are of two distinct colours, and examination indicates that reddish-tinted larvæ develop into male moths, while green ones give rise to females; this point requires further investigation.

Many of the larvæ are attacked by disease in the pre-pupal period and shrivel up. Many others are parasitized by a Tachinid, *Sturmia distincta*, Wied, which oviposits on them. Severe infestations occur so suddenly that time is an essential factor in successful control. An effective remedy devised by the author consists of 11 lbs. lead arsenate paste, with 24 lbs. atomic sulphur, 1 lb. ground glue, 1½ U. S. pints Black-leaf 40 and 200 gals. of water. This is most effective if applied a few days before the larvæ are fully grown. The spray should be applied with a spray gun. In one severely infested vineyard, the treatment of which is described, an average of five outfits of two spray guns each were kept working for 17 days from 23rd May to 9th June, during which time 165,000 U.S. gallons of the spray were used. The cost of the materials, apparatus and labour amounted to about \$11,000. As the crop saved was estimated by the owner to be worth about \$300,000, the control work cost less than 4 per cent of the net returns. Caterpillars of the first and second instars were very susceptible to the spray and died almost immediately after contact. After 48 hours all individuals on the vines were either dead or dying.

In infested vineyards where pupation had already taken place, turkeys were turned into them after a shallow cultivation of the soil; the birds ate numbers of the pupæ, but the tough shell was responsible for the death of many of the birds, so the measure cannot be recommended. Ploughing was started early the following spring while the ground was still quite moist, and, although only a small proportion of pupæ were destroyed by this means, very many were eaten by large numbers of crows that followed the plough. It was observed that these birds did not eat the tough pupal shell, but only the contents.

European Frit Fly in North America.—

ALDRICH, J. M., in *Journal of Agricultural Research*, Vol. 18, No. 9, pp. 451-473. Washington, February 2, 1920.

The investigations recorded in this paper were carried out in 1914-1916. A history of the early records of the frit fly is given. Linnæus described the insect in 1758 as *Musca frit*; Fabricius included it in the genus *Oscinis*. Since that date frit flies have been recorded as various species of *Oscinis* in North America, but the author's studies of these forms have led him to the conclusion that *O. pusilla*, Meig., *O. nitidissima*, Meig., *O. carbonaria*, Lw., *O. variabilis*, Lw., *O. nigra*, Tucker, and *O. sorror*, Macq., are all synonyms of *Oscinella* (*Oscinis*) frit, the multiplicity of names having arisen from the variability and wide distribution of the species.

This fly is most abundant in the region where winter wheat is grown, i.e., from the Great Lakes to the Ohio River and westward to the Missouri. Outside this area it has been found in abundance locally from the Atlantic to the Pacific and from Ottawa to the Gulf of Mexico, its northern limit being 58° in Alaska. It is general wherever grass is abundant and green for a considerable part of the year. In the arid West it occurs along streams, in irrigated pastures, or at high altitudes where the humidity is greater. The various stages of the insect are described.

In Indiana, where these investigations were made, *O. frit* winters in the larval stage in winter wheat. Following the emergence of this brood in spring, there are four summer generations. The method of rearing these generations in the laboratory is described. The first emergence extended in 1916 from about the middle of April to mid-May; adults of the first summer generation emerged from about 12th June to 13th July, those of the second generation from 16th to 26th July, those of the third, from 10th to 28th August. Only two flies of the fourth summer generation were reared; these emerged on 24th and 25th September. While the record covers too few individuals to exclude the possibility of variations in the number of generations, it indicates that four summer generations are the normal number.

The flies oviposit on the young and tender shoots of grains and grasses, the larvæ entering the shoots and feeding downward in the middle; occasionally eggs are laid on or within the glumes just after heading, in which case the larvæ eat out the soft kernel. The flies seem to be attracted by an exudation from the fresh epidermis of grass that is producing new shoots. Bluegrass lawns that are kept watered and mown yield large numbers of *O. frit*, practically throughout the season. The relation of *O. frit* to grasses requires much further study. A list is given of the known food-plants of the species; timothy grass, which is included

in the list, has proved unattractive. In experiments, wheat, rye, emmer, barley and oats were infested in the order given. While in England, *O. frit* is frequently referred to as the "oat fly," in America it seems not to feed upon the oat at all, unless compelled to do so, when it sometimes accepts oats and sometimes prefers starvation. Wheat, on the other hand, is preferred for oviposition; eggs are laid on the autumn wheat soon after it appears, and spring wheat is attacked by the first summer generation. A characteristic symptom of infestation in young shoots of all kinds is the dying of the central leaf, while the others around it remain green. While in cool and moist weather the injured leaf may remain green for some time, in hot dry weather it is killed at once. The insect has rather a wide range of habits and may concentrate on any one of several food-plants; it sometimes severely attacks young, unripe grains, though ordinarily it does not affect them.

Owing to the great difficulty of rearing parasites it has been impossible to determine any species, but it appears evident that *O. frit* is freely parasitized by minute Hymenoptera.

The attack of *O. frit* upon wheat is very similar to that of the Hessian fly (*Mayetiola destructor*), and therefore it is thought that the remedy for one trouble may dispose of the other. As early as 1777, a change in the methods of tillage was recommended for the control of *O. frit* and this is still the only practicable remedy. In wheat sown at weekly intervals from 12th September to 17th October, it was noticed that infestation was heaviest in the earliest sowing and decreased regularly to the latest sowings, in which infestation was nil. It therefore seems that the recommendation of late sowing to escape the Hessian fly will equally apply to *O. frit*, though with the former the possibility of infestation entirely ceases at a certain date, while with the latter the chances decrease regularly until the cold weather. Wheat sown in late spring is more infested than that sown early. Continuous cropping in wheat appears to make no difference, for the fly migrates freely for considerable distances.

Use of Toxic Gases as a Possible Means of Control of the Peach-Tree Borer.—

BLAKESLEE, E. B., in *United States Department of Agriculture*, Bulletin 796, pp. 23. Washington, D.C., October, 1919.

Investigations were begun in 1915 with the object of developing a possible method of controlling the peach tree borer, *Aegeria* (*Sanninoidea*) *exitiosa*, Say, by the use of local applications of volatile toxic compounds to the soil at the base of the tree.

The substances experimented with include carbon bisulphide, carbon tetrachloride, hydrocyanic acid gas, naphthalene and para-dichlorobenzene. With the exception of

the last-named all the tests gave negative results.

Some account of para-dichlorobenzene is given and its previous uses are reviewed. The action of the gas generated is quite local and an even distribution about the tree is desirable; in the present experiments it was found most convenient to pulverize the material to about the fineness of coarse salt. The soil around the tree was broken up to a depth of 1 or 2 inches but not scraped away from the collar of the tree unless there was a decided mound. Para-dichlorobenzene was then sprinkled in a band 1 or 2 inches wide round the collar of the tree as nearly as possible at the level of the uppermost galleries. It is probably best to keep the material from actual contact with the bark to the extent of about half an inch, but the practical importance of this precaution is not known. The material is finally covered to a depth of about 2 inches with soil and the mound slightly compressed. No lumps or stones should be left against the trunk above the surface as they furnish shelters for the newly hatched larvæ out of reach of the vapour.

A total of 126 eight-year-old trees were treated with various doses ranging from $\frac{1}{2}$ oz. to 10 oz. per tree. It was found that less than $\frac{1}{2}$ oz. would probably not give consistent control, but there is no advantage in giving a larger dose than 1 oz. The best time for application is 3 weeks before the end of the hatching period, when all larvæ will be killed except a few that already have entered the tree. The seasonal fluctuations in the period of oviposition prevent the determination of the time of application to any very great degree of exactness, but during these observations applications made between the end of August and end of September proved most satisfactory, the larvæ being killed in about a fortnight. There is apparently no advantage in making a second application, which only increases the risk of injury to the tree. Although it has been found that, with all gases, trees recover more readily from injury in the spring at the beginning of the growing season, applications made at that time are most efficacious, as the majority of the larvæ have penetrated the tree and their galleries provide a chance of escape from the gas.

Trees of six years standing or older do not appear to show any ill effects from fumigation but the injury to younger trees was too great to warrant the use of this substance. It has so far been used with almost uniform results on a variety of soils.

This method of fumigation has also been tried on apple trees against *Saperda candida*, but the trees were severely injured, there being apparently a wide difference in susceptibility between apple and peach trees in this respect. On the latter the gas was also observed to destroy the fungus gnat, *Mycetobia* sp., which feeds on the gum.

Flat-Headed Apple Tree Borer.—BROOKS, F. E., in *United States Department of Agriculture, Farmers' Bulletin* 1065, pp. 12, Washington, D.C., October, 1919.

The flat-headed appletree borer, *Chrysobothris femorata*, F., occurs over almost all the United States and in Southern Canada. It injures a great variety of fruit, shade, and forest trees. Damage is only done by the larva, and only to trees that are weakened in some way, such as by transplanting or injury. The larva cannot thrive in a perfectly healthy tree, though it may continue for months in a half-starved condition, and finally completes its development if the tree is weakened in any way. The normal life-cycle takes a year.

The natural enemies of this beetle are woodpeckers and other birds, ants and some Hymenopterous parasites including:—*Bracon charus*, Riley, *B. pectinatus*, Say, *Spalhius pallidus*, Ashm., *Labena apicalis*, Cr., *L. grallator*, Say, and *Phasgonophora sulcata*, Westw.

The most important feature of control is a good condition of the trees. Low-formed branches on the south side of trees, and boards set in the ground to throw a shadow on the trunks of newly-planted trees cause the beetles to lay their eggs elsewhere, in sunnier places. Traps consisting of logs of any kind laid in the sun and covered with a sticky material may be used. Injuries on a tree may be protected with paint, and during the season of oviposition the whole trunk may be covered with paper or other wrapping. Dying or cut wood of any kind should never be left in an orchard from one season to another, in case beetles may emerge from it.

Birds and Trees in Winter.—ALLEN, A. A., in *American Forestry*, Vol. 26, No. 313, pp. 45-47. Washington, January, 1920.

Attention is drawn to the importance of protection and shelter, especially during the winter, for the insectivorous birds that are so beneficial to fruit and forest trees in America. It is pointed out that sprays against such pests as the codling moth (*Cydia pomonella*) are only efficacious if applied on just the right spot at the right time, and that during the entire life-cycle of the pest there are only a few hours when the spray can be effective and, since all the eggs do not hatch at once, the chances of killing all larvæ are slight. Birds, however, can act as the destroying agents during two periods, first when the moths transform in the spring and warblers, vireos and other migrating birds pass through the orchards, and again during the entire winter when nuthatches, woodpeckers and creepers are hunting over the bark for insects. Young tent caterpillars (*Malacosoma*) are similarly attacked by warblers, vireos and wrens on their northward migrations, the half-grown caterpillars are seized in their nests by

orioles, while full-grown ones are eaten by cuckoos. Nuthatches, chickadees and crows all devour the eggs in winter. The downy woodpecker and the hairy woodpecker dig out boring insects from the trunks of pines,

elms, and other shade trees. It is suggested that small refuges and feeding-stations should be placed in every forest reserve and a little suet should be attached to some of the trees to attract the winter birds.

AGRICULTURAL STATISTICS

THE WORLD'S WHEAT PROSPECTS FOR 1920-21.

BY T. K. DOHERTY

There are not as many countries reporting to the Institute as before the war and many of those reporting are late in forwarding their reports. With the aid of the commercial agencies, and particularly Broomhall, to-

gether with the general information concerning the condition of crops, average production, etc., it is possible to make estimates of value for practical purposes.

WORLD'S PRODUCTION OF WHEAT

Countries.	1920,	1919,	Five years' pre-war average 1909-13
	Bushels.	Bushels.	Bushels.
NORTH AMERICA—			
Canada.....	288,000,000 (a)	193,260,000	197,118,000
United States.....	809,000,000	940,987,000	686,697,000
Mexico.....	10,000,000 (a)	10,000,000 (a)	8,000,000
Total North America.....	1,107,000,000	1,144,247,000	891,815,000
SOUTH AMERICA—			
Argentina.....	160,000,000 (a)	214,142,000	148,908,000
Chili.....	14,000,000 (a)	12,000,000 (a)	14,000,000
Uruguay.....	6,000,000 (a)	5,416,000	6,519,000
Total South America.....	180,000,000	231,558,000	169,427,000
AUSTRALASIA—			
Australia.....	120,000,000 (b)	44,001,000	90,500,000
New Zealand.....	7,070,000 (a)	4,005,000	7,070,000
Total Australasia.....	127,070,000	48,006,000	97,570,000
AFRICA—			
Algeria.....	18,000,000 (a)	20,967,000	34,998,000
Egypt.....	25,000,000 (a)	30,137,000	34,121,000
Tunis.....	5,000,000 (a)	7,349,000	6,230,000
Union of S. Africa.....	6,500,000 (a)	6,630,000	6,520,000
Total Africa.....	54,500,000	65,083,000	81,869,000
ASIA—			
India.....	376,880,000	280,074,000	359,035,000
Japan.....	30,000,000 (a)	29,817,000	24,166,000
Korea.....	7,000,000 (a)	7,144,000	5,922,000 (c)
Persia.....	13,000,000 (a)	13,000,000 (a)	13,600,000
Total Asia.....	426,880,000	330,035,000	402,723,000

WORLD'S PRODUCTION OF WHEAT—*Concluded.*

Countries.	1920.	1919.	Five years' pre-war average 1909-13.
	Bushels.	Bushels.	Bushels.
EUROPE—			
Great Britain and Ireland.....	69,000,000 (a)	69,347,000	59,640,000
Norway.....	1,000,000 (a)	1,071,000	306,000
Sweden.....	10,000,000 (a)	9,509,000	8,103,000
Denmark.....	6,500,000 (a)	5,916,000	5,344,000
Netherlands.....	6,500,000 (a)	6,015,000	4,896,000
Belgium.....	11,000,000 (a)	9,895,000	14,894,000
France.....	296,000,000 (d)	177,980,000	317,639,000
Spain.....	144,000,000 (b)	129,251,000	130,447,000
Portugal.....	7,000,000 (a)	6,400,000 (a)	7,440,000
Italy.....	148,000,000 (b)	169,565,000	183,336,000
Greece.....	10,000,000 (a)	9,693,000	4,320,000
Switzerland.....	3,500,000 (a)	3,524,000	3,314,000
Roumania.....	35,000,000 (a)	50,755,000	77,422,000 (e)
Bessarabia.....	8,000,000 (a)	12,000,000 (a)	20,120,000 (e)
Czecho-Slovakia (Bohemia, Moravia and Silesia).....	15,000,000 (a)	15,051,000	23,541,000 (g)
Jugo-Slavia (Serbia, Croatia and Slovenia).....	5,000,000 (a)	50,956,000	.....
Bulgaria (old and new territory).....	35,000,000 (a)	34,029,000	29,308,000 (f)
Austria (h).....	10,000,000	8,000,000	11,000,000
Hungary (h).....	70,000,000	85,000,000	150,000,000
Germany (h).....	100,000,000	79,702,000	130,000,000
Total Europe.....	990,500,000	933,659,000	1,181,070,000
Grand Total.....	2,885,950,000	2,752,588,000	2,824,474,000

(a) Estimate based on condition.

(b) Broomhall.

(c) Average 1913-17.

(d) Semi-official.

(e) Average 1912-15.

(f) Average 1914-18.

(g) Year 1914.

(h) Estimates made taking into consideration the reductions in territory.

No reports have been received as to crop conditions in Poland. The production of wheat in 1913 in the provinces now comprised in that country was 67,000,000 bushels.

The countries dealt with in this statement will therefore produce 133 million bushels more wheat than in 1919. North America will produce 37 million bushels less than a year ago, but 215 million bushels more than the pre-war average. Argentina, with a reduced acreage, will probably exceed but slightly its pre-war average, and this results in South America exhibiting a reduction of 51 million bushels. Broomhall's high estimate for Australia (which we believe excessive) gives to Australia 80 million bushels more than last year. The official report of India's big crop brings Asia nearly 100 million bushels ahead of its previous harvest. Drought, however, has seriously reduced the harvest of North Africa, even to a point 11 million bushels less than the previous year's, a crop which was a very bad one.

Importing Europe makes a better showing than last year by 57 million bushels, but that does not take into account either Poland or Russia concerning which nothing is known. It is, however, known that Poland required and received considerable supplies last year and these conditions are likely to continue at least through the coming cereal year.

Less than one-quarter of the world's total production, as above presented, will enter into the world's trade and it is of particular interest to consider briefly in the following tables the chief countries that are concerned in that trade, estimating on one hand the requirements of the importing countries, and on the other the exportable surplus of the exporting countries.

WHEAT—DEMAND SITUATION.

Countries.	Crops, 1920.	Normal Con- sumption.	Indicated Require- ments.	Probable Imports
	Bushels.	Bushels.	Bushels.	Bushels.
Great Britain and Ireland.....	69,000,000	276,000,000	207,000,000	210,000,000
France.....	296,000,000	361,000,000	65,000,000	50,000,000
Italy.....	148,000,000	237,000,000	89,000,000	70,000,000
Spain.....	144,000,000	136,000,000		4,000,000
Portugal.....	7,000,000	8,000,000		10,000,000
Greece and Jugo Slavia.....	15,000,000			40,000,000
Belgium.....	11,000,000	65,000,000	54,000,000	30,000,000
Netherlands, Switzerland, Norway, Sweden and Denmark.....	27,000,000			20,000,000
Egypt, Mesopotamia, Constantinople and Turkey.....				50,000,000
Germany.....				40,000,000
Austria and Poland.....				
Total for Europe.....				524,000,000
Ex Europe.....				70,000,000
World's Aggregate Requirements.....				594,000,000

WHEAT—SUPPLY SITUATION.

Countries.	Carry-over, Aug. 1, 1920.	Production, 1920.	Home needs and waste.	Probable export.	Carry-over, Aug. 1, 1921.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
Canada.....	5,000,000	288,000,000	85,000,000	190,000,000	18,000,000
United States.....	150,000,000	809,000,000	619,000,000	240,000,000	100,000,000
Argentina.....	5,000,000	160,000,000	75,000,000	70,000,000	20,000,000
Australia.....		120,000,000	40,000,000	60,000,000	20,000,000
India.....		377,000,000	317,000,000	40,000,000	20,000,000
Totals.....	160,000,000	1,754,000,000	1,136,000,000	600,000,000	178,000,000

In the preceding export table we omit any mention of Bulgaria, Roumania, the Ukraine and the rest of Russia, from some of which regions exports are quite probable. Exports of from 50 to 100 million bushels from that source will of course have a powerful influence on the market. In the present statement we are assuming that, apart from Egypt, the North Africans will be able to feed themselves. This is, however, an uncertain factor. The North American position is safeguarded for the present from the fact that the supplies of the Southern Hemisphere have been entirely cleaned up. Assuming that present weather conditions

shall continue, and with adequate shipping, there can be no doubt that except during the first half of the shipping season, until Australia and Argentina come into the market, ample supplies of wheat will be available to meet the demand.

The most recent reports, especially from spring wheat territory in the United States and Canada, tend to confirm earlier predictions of an exceptionally large crop, and even higher figures are talked of than are forecasted in the preceding statement.

The following statement, partly estimated, shows the course of exports during the past grain year.

MONTHLY EXPORTS OF WHEAT, 1919-20.

(Including flour for Canada and the United States.)

Months.	Canada.	United States.	Australia.	Argentina.	Total for four countries.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
1919.					
August.....	9,562,000	20,310,000	10,508,000	13,528,000	53,908,000
September.....	4,247,000	24,816,000	8,800,000	15,804,000	53,667,000
October.....	6,454,000	20,979,000	10,632,000	16,824,000	54,889,000
November.....	12,138,000	23,396,000	11,568,000	11,852,000	58,954,000
December.....	13,205,000	15,427,000	5,368,000	19,737,000	53,737,000
1920.					
January.....	12,299,000	12,271,000			
February.....	7,615,000	10,581,000			
March.....	5,915,000	16,881,000			
April.....	2,493,000	13,722,000			
May.....	2,755,000	25,885,000			
June.....	7,950,000	22,000,000 (a)			
July.....	8,000,000 (a)	20,000,000 (a)			
Total Aug. 1, 1919 to July 31, 1920...	92,633,000	223,653,000	89,000,000 (b)	259,000,000 (b)	664,289,000 (c)

(a) Estimates.

(b) Monthly figures for Australia and Argentina are not available since Dec. 31st.

(c) In the February issue of the *Gazette* it was forecasted that there would be a total export of 665,000,000 bushels.

THE ACREAGE OF THE CROPS OF THE NORTHERN HEMISPHERE IN 1920.

WHEAT AND RYE.

Countries.	Wheat.			Rye.		
	1920.	1919.	Average, 1914-18.	1920.	1919.	Average, 1914-18.
	acres.	acres.	acres.	acres.	acres.	acres.
Belgium.....	353,000	329,000	.....	531,000	546,000	.....
Spain.....	10,050,000	10,378,000	10,087,000	1,920,000	1,808,000	1,835,000
France.....	12,097,000	11,315,000	12,464,000	2,001,000	1,817,000	2,128,000
Scotland.....	67,000	80,000	68,000	.....	.....	.....
Roumania.....	1,891,000	2,965,000	4,690,000	158,000	219,000	191,000
Bessarabia.....	406,000	903,000	.....	129,000	428,000	.....
Switzerland.....	131,000	.....	130,000	52,000	55,000	58,000
Canada.....	17,186,000	19,126,000	14,577,000	730,000	753,000	230,000
United States.....	53,652,000	73,243,000	54,119,000	5,470,000	7,063,000	3,918,000
Guatemala.....	22,000	21,000	.....	.....	.....	.....
India.....	29,865,000	23,806,000	31,940,000	.....	.....	.....
Japan.....	1,325,000	1,362,000	1,250,000	.....	.....	.....
Algeria.....	3,116,000	2,800,000	3,251,000	.....	.....	.....
Morocco.....	1,489,000	1,551,000	.....	.....	.....	.....
Tunis.....	1,384,000	1,190,000	1,333,000	.....	.....	.....

BARLEY AND OATS.

Countries.	Barley.			Oats.		
	1920.	1919.	Average 1914-18.	1920.	1919.	Average 1914-18.
	acres.	acres.	acres.	acres.	acres.	acres.
Belgium.....	80,000	75,000	.....	566,000	550,000	.....
Spain.....	4,265,000	4,254,000	3,858,000	1,574,000	1,595,000	1,402,000
France.....	1,449,000	1,340,000	1,593,000	8,166,000	6,815,000	7,748,000
Scotland.....	185,000	174,000	165,000	1,110,000	1,111,000	1,035,000
Switzerland.....	.....	.....	.....	57,000	57,000	79,000
Canada.....	2,588,000	2,646,000	2,113,000	15,555,000	14,952,000	12,143,000
United States.....	7,467,000	7,420,000	8,228,000	41,032,000	42,400,000	41,773,000
Japan.....	2,691,000	2,931,000	3,066,000	.....	.....	.....
Algeria.....	2,679,000	2,640,000	2,896,000	547,000	533,000	594,000
Morocco.....	1,508,000	1,523,000	1,970,000	6,000	7,000	6,000
Tunis.....	1,137,000	977,000	1,101,000	148,000	127,000	256,000

FOREIGN CROP CONDITIONS

(FROM BROOMHALL.)

United Kingdom.—On the whole June was a favourable month for crops and farm work and the grain crops improved generally. During the first week of July there was much rain with low temperatures. Wheat was still reported to be a fair crop.

France.—At the beginning of July the harvest in the southern region was progressing but reports of results were not altogether favourable. A semi-official forecast of the wheat crop mentions 296,000,000 bushels against 178,000,000 bushels last year.

Denmark.—Wheat and rye are over average crops, barley and oats about average.

Spain.—Early in July it was reported that the harvest had commenced and very good results were expected for wheat and barley.

Italy.—The wheat harvest was a little better than expected in Sicily, fairly good in the Central Provinces, and is expected to be good in the North. The estimated out-turn will not be inferior to the previous forecast of 148,000,000, but this is quite a small crop.

Germany.—Favourable reports of the prospects for the coming harvest have been received.

Austria, Czecho-Slovakia and Jugo-Slavia.—Roumanian papers have confirmed good prospects in these countries, but also say that the Hungarian crops were damaged by drought. In Austria prospects are reported as excellent.

Greece.—This year's harvest is reported a good one in spite of damage from rains.

Roumania.—It is anticipated that this year's harvest will be one of the best.

Russia.—There have been no reports received as to crops or supplies.

North Africa.—Most of the grain-growing districts have suffered from drought and reports of the crops were unfavourable.

India.—It is reported that the rainfall has been insufficient, although well distributed. Early in July there were indications of increased rainfall.

Argentina.—There have been complaints of insufficient rains from northern and southern regions. The Minister of Agriculture on June 24 estimated that there were still 30,000,000 bushels available for export.

Australia.—Early in July the drought was reported as thoroughly broken. Prospects were for a harvest of 120,000,000 bushels of wheat. Western Australia has 3,000,000 acres under wheat against 1,000,000 last year. South Australia was also expected to show a good acreage.

UNITED STATES JULY CROP REPORT

The United States Department of Agriculture makes the following estimates of the 1920 crops based on condition reports for July 1:—

Crops.	1920.	1919.
	Bushels.	Bushels.
Winter wheat.....	518,000,000	731,636,000
Spring wheat.....	291,000,000	209,351,000
All wheat.....	809,000,000	940,987,000
Corn.....	2,779,000,000	2,917,450,000
Oats.....	1,322,000,000	1,248,310,000
Rye.....	82,200,000	88,478,000
Barley.....	193,000,000	165,719,000
Flaxseed.....	14,400,000	8,919,000
Potatoes.....	388,000,000	357,901,000

THE 1920 CROPS OF CANADA

Crop.	1920.	1919.
	Acres.	Acres.
Wheat.....	17,186,000	19,126,000
Rye.....	730,000	753,000
Barley.....	2,588,000	2,646,000
Oats.....	15,555,000	14,952,000
Flaxseed.....	1,204,000	1,093,000
Corn for husking.....	268,000	265,000
Corn for fodder.....	527,000	512,000
Sugar beets.....	26,000	25,000

LIVE STOCK STATISTICS

ALSACE-LORRAINE.

Numbers of live stock in Alsace-Lorraine on December 2, 1919, compared with December 4, 1918.

Classification.	Number on		Increase (+) or decrease (-).	
	Dec. 2, 1919.	Dec. 4, 1918.	Number.	Per cent.
Horses.....	83,188	70,475	+ 12,713	+18.0
Cattle.....	385,207	393,205	- 7,998	- 2.0
Sheep.....	29,839	37,460	- 7,620	-20.3
Pigs.....	291,865	246,958	+ 44,907	+18.2
Goats.....	107,157	121,340	- 14,183	-11.7
Geese and ducks.....	165,113	179,038	- 13,925	- 7.8
Poultry.....	1,778,444	1,366,292	+412,152	+30.2

GERMANY.

Numbers of live stock in Germany in March, 1920, compared with March, 1919.

Classification.	Number on		Increase (+) or decrease (-)	
	March, 1920.	March, 1919.	Number.	Per cent.
Horses (Prussia only).....	2,382,241	2,378,457	+ 3,784	+ 0.2
Cattle.....	16,213,454	15,882,164	+ 331,290	+ 2.1
Sheep.....	6,199,481	5,684,543	+ 514,938	+ 9.1
Swine.....	9,323,444	6,755,806	+2,568,138	+38.0
Goats.....	3,689,754	3,610,692	+ 79,062	+ 2.2

SWEDEN.

Numbers of live stock in Sweden on June 1, 1919, compared with June 1, 1918.

Classification.	June 1, 1919.	June 1, 1918.	Increase (+) or decrease (-)	
			Number.	Per cent.
Horses.....	715,681	714,822	+ 859	+ 0.1
Cattle.....	2,550,828	2,584,159	- 33,331	- 1.3
Sheep.....	1,563,654	1,409,473	+154,181	+10.9
Goats.....	133,150	133,304	- 154	- 0.1
Swine.....	716,783	633,862	+ 82,921	+13.1
Poultry.....	4,828,899	4,774,566	+ 54,333	+ 1.1
Turkeys.....	4,267	4,050	+ 217	+ 5.4
Geese.....	21,093	17,530	+ 3,563	+20.3
Ducks.....	17,089	14,600	+ 2,489	+17.0
Honey-Bee Colonies.....	126,009	133,535	- 7,526	- 5.6

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September, 1920

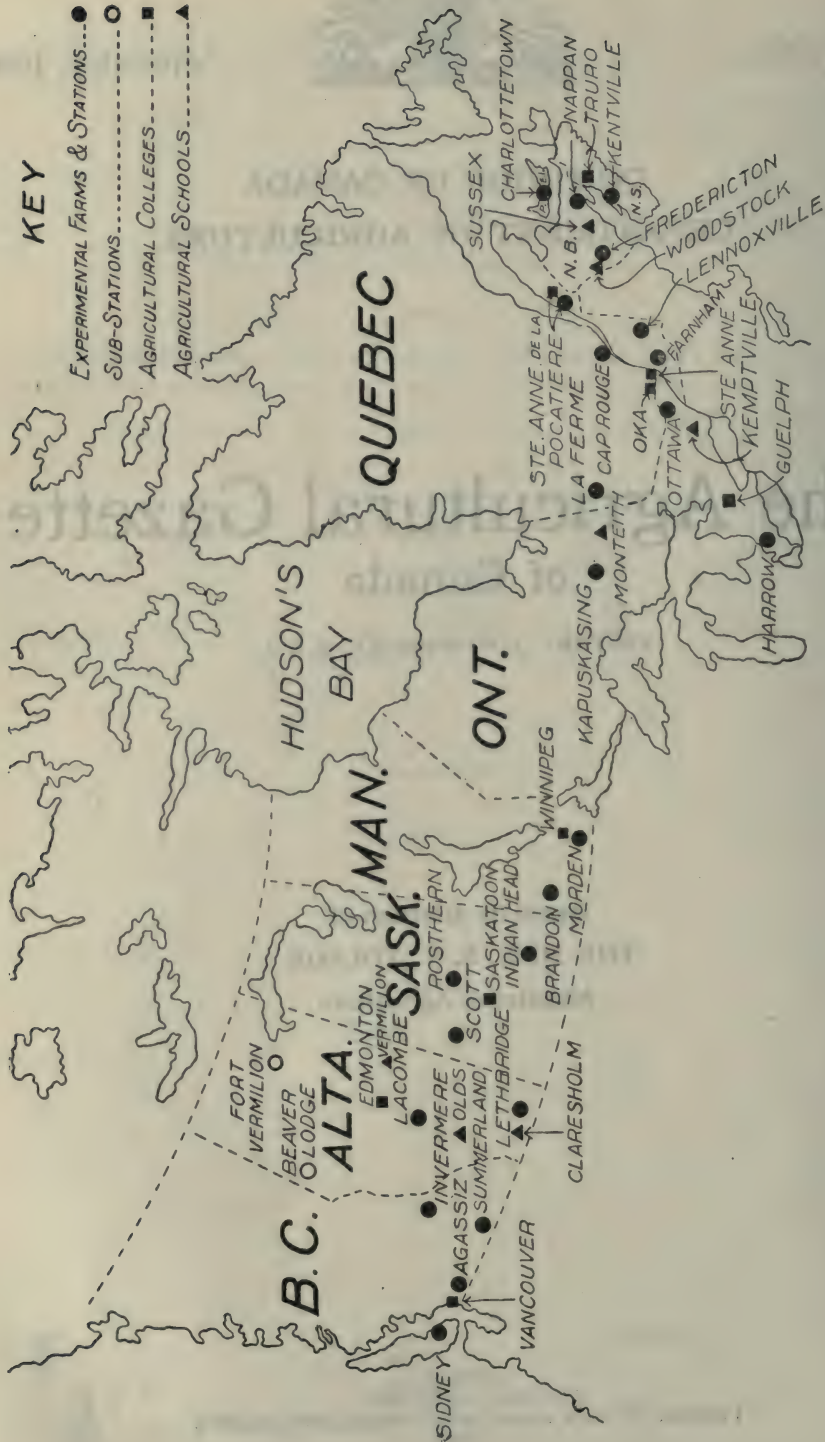
DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE

The Agricultural Gazette of Canada

EDITOR: J. B. SPENCER, B. S. A

Issued by direction of
THE HON. S. F. TOLMIE
Minister of Agriculture

OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920



MAP OF CANADA SHOWING THE LOCATIONS OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

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OF CANADA

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SEPTEMBER, 1920

No. 9

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THE AGRICULTURAL INSTRUCTION ACT ALLOTMENTS

THE agreements as to the objects for which the grants made under The Agricultural Instruction Act for the fiscal year 1920-21 shall be expended, have been completed for eight of the nine provinces. The exception is that for British Columbia, for which province plans and recommendations have not as yet been presented for the concurrence of the federal authorities.

Under the above named Act, a Dominion grant of \$1,100,000 is divided annually between the provinces for the purpose of aiding and advancing the farming industry of Canada. The allotment for the current year is as follows:—

Alberta.....	\$ 66,965 62
British Columbia.....	69,199 06
Manitoba.....	77,113 11
New Brunswick.....	64,110 80
Nova Scotia.....	81,716 69
Ontario.....	336,303 26
Prince Edward Island.....	31,749 22
Quebec.....	271,113 76
Saskatchewan.....	81,728 48
Veterinary Colleges.....	20,000 00
	<hr/>
	\$ 1,100,000 00

The grant is supplementary to provincial appropriations, and is made with a view to enabling the provinces, by means of the additional fund thus placed at their disposal, to finance and carry out instructional effort in a more extended and comprehensive manner than would otherwise be possible.

No narrow boundaries are set to limit unduly the application of the grant. The general requirements of the Act are that the moneys shall be expended in promoting education, instruction and demonstration. The precise methods of application are left to the provinces to determine in accordance with their individual needs. Consequently great latitude is allowed as to the nature of the undertakings to receive assistance.

The founders of the policy which the Act brings into practice believed that, in order to promote rural effectiveness, better farming methods were

needed in the first place; second, that more adequate educational facilities suited to rural life should be provided, and third, that country home environment should be improved and made more congenial. The promotion of these objectives would, it was believed, result in a greater measure of prosperity and contentment for the farming community.

The first phase of the project contemplated the conveyance of up-to-date information to the adult as to the best methods and practices connected with farming. All practical forms of extension and demonstration were contemplated under this head. The second phase had to do with the education of country youth. It presents two aspects, the scholastic and the vocational. In order to bring the scholastic aspect more into line with country environment, elementary agricultural teaching was introduced. The concomitants of this movement were the school and home garden, boys' and girls' club work and the school fair. For the development of these undertakings and for the preparatory training of teachers the grant is primarily accountable. The development of the vocational phase includes the increased efficiency of colleges of agriculture, and the provision in certain provinces of vocational agricultural

schools, of a lower grade than the colleges, together with special departments in high schools devoted to the requirements of agricultural students. With the placing of adequate educational facilities within the easy reach of all country boys and girls, which is the goal aimed at, comes the assurance of permanent benefit to agriculture and to those engaged in it.

For the advancement of country life the grant also makes provision. Chiefly through the Women's Institutes, instruction is provided in household science, domestic art, sanitation, home nursing and similar subjects. The fact is recognized that the family and social life of the rural population possesses an importance not to be lost sight of. Along with the development of agriculture as an economic pursuit must go its development as a mode of life. With the promotion of better farming, should go hand in hand efforts for the advancement of education, co-operation, family welfare, health, and moral ideals, these working together for the highest type of rural citizenship.

The schedules of allotment given below, which accompany the agreements with the provinces, will indicate the extent and variety of the work being carried on by provincial departments of agriculture and education with the assistance of the grant.

THE ALLOTMENTS

PRINCE EDWARD ISLAND

1. Agricultural Buildings—equipment and maintenance.....	\$ 1,507 00
2. Director and Agricultural Representatives.....	3,235 00
3. Short Courses.....	246 00
4. Drainage, soils and crops.....	7,968 00
5. Live Stock and Dairying.....	2,056 00
6. Poultry, Horticulture, Beekeeping and Co-operative Marketing.....	855 00
7. Women's Institutes.....	2,566 00
8. Agricultural Instruction in Public and High Schools, Training of Teachers, Allowances, Grants, maintenance of Rural Science Department, Prince of Wales College.....	12,806 00
9. Contingencies and Miscellaneous.....	510 22
	<hr/>
	\$ 31,749 22

NOVA SCOTIA

College of Agriculture.

1. Science Building—Interest and Sinking Fund.....	\$ 8,000 00
2. Salaries and Maintenance.....	23,000 00

Instruction and Demonstration.

3. Agricultural Representatives.....	12,000 00
4. Short Courses.....	1,000 00
5. Dairying.....	5,500 00
6. Poultry.....	1,500 00
7. Beekeeping.....	500 00
8. Drainage and Soil Survey.....	1,800 00
9. Soils and Fertilizers.....	1,500 00
10. Field Crops.....	1,200 00
11. Fruit Growing.....	1,000 00
12. Women's Work.....	4,000 00
13. Entomological Work.....	7,500 00

Elementary Agricultural Education .

14. Agricultural Instruction in Public, High and Normal Schools, Teacher Training, grants and allowances.....	12,000 00
15. Contingencies.....	1,216 69
	<hr/>
	\$ 81,716 69

NEW BRUNSWICK.

1. Agricultural Schools—Salaries and Maintenance.....	\$ 400 00
2. Agricultural Representatives.....	11,000 00
3. Beekeeping.....	2,700 00
4. Soils and Drainage.....	5,000 00
5. Horticulture.....	5,000 00
6. Short Courses.....	800 00
7. Live Stock.....	3,000 00
8. Dairying.....	5,400 00
9. Poultry.....	4,500 00
10. Entomology.....	110 00
11. Agricultural Societies.....	3,000 00
12. Women's Institutes.....	9,300 00
13. Elementary Agricultural Education:	
Agricultural Instruction in Public, High and Normal Schools, Household Science, Teacher Training, grants and allowances.....	13,900 80
	<hr/>
	\$ 64,110 80

QUEBEC.

Colleges and Schools of Agriculture

1. Grants and allowances—Macdonald College, School of Agriculture, Ste-Anne de la Pocatière, Oka Agricultural Institute.....	\$ 75,000 00
2. School of Veterinary Science, building and extension.....	5,000 00

Instruction and Demonstration:

3. Animal Husbandry.....	9,000 00
4. Poultry Husbandry.....	18,000 00
5. Horticultural and Entomological Work.....	31,000 00
6. Experimental and Demonstration Orchards.....	4,000 00
7. Dairying, educational work in cheese and Butter-making.....	5,000 00
8. Agricultural Representatives.....	69,000 00
9. Seed selection, clover plots and demonstrations.....	9,000 00
10. Beekeeping—Educational Work.....	7,000 00
11. Drainage.....	6,000 00
12. Maple Industry—Maintenance of schools and allowance to students.....	4,000 00
13. Short Courses and Lectures.....	9,113 76

Elementary Agricultural Education

14. To promote the teaching of agriculture in Academies, Rural and Normal Schools, Teacher Training, School Gardens.....	8,000 00
15. To promote the teaching of Domestic Science in Academies and Normal Schools—Grants, lectures and inspection.....	10,000 00
16. School Children's Exhibits.....	2,000 00
	<hr/>
	\$ 271,113 76

ONTARIO

Agricultural Colleges and Schools

1. Ontario Agricultural College:		
(a) Buildings, equipment and furnishings.....	\$ 14,000 00	
(b) Salaries and expenses, additions to staff, maintenance.....	15,000 00	
	<hr/>	\$ 29,000 00
2. Agricultural School and Farm:		
(a) Capital expenditure.....	50,000 00	
(b) Administrative and teaching staff, maintenance, purchase of stock, machinery, repairs, services, expenses and equipment.....	20,000 00	70,000 00
	<hr/>	

Instruction and Demonstration

3. Agricultural Representatives, including clerical and other assistance in connection with the administration.....	135,000 00
4. Extension work in Household Science in rural communities.....	1,500 00
5. Co-operation and Markets, investigation of marketing conditions for Ontario crops, educational work in connection with the marketing of farm products, including organization of co-operative societies.....	11,000 00
6. Demonstration and instruction in vegetable growing.....	12,000 00
7. O.A.C. Short Courses for winners of Acre Profit and Live Stock Competitions including travelling and living expenses.....	2,500 00
8. Women's Institute work, including courses in cooking, sewing, etc.....	5,000 00
9. Short Courses for Poultry Judges, including travelling and living expenses..	1,000 00
10. Lectures on Horticulture.....	500 00
11. Demonstrations in growing and handling fruit.....	1,803 26
12. Demonstrations with vegetables and hardy fruits in New Ontario.....	5,000 00
13. Vineland Horticultural Experiment Station, experimental work.....	3,000 00
14. Demonstration work on soils.....	6,000 00
15. Beekeeping.....	1,000 00
16. Instruction and special educational work in growing and handling corn....	3,500 00
17. Drainage work.....	4,500 00

Elementary Agricultural Education

To provide for and to encourage the teaching of agriculture, manual training as applied to work on the farm, and domestic science in High, Public, Separate and Continuation Schools, and in Universities, to be available for grants, services, expenses and equipment, and travelling and living expenses of teachers, inspectors and others in attendance at Short Courses or other educational gatherings, and to be paid out on the recommendation of the Department of Education.....	44,000 00
	<hr/>
	\$ 336,303 26

MANITOBA

Agricultural Representatives.....	\$ 13 000 00
Dairy Work.....	6,000 00
Poultry Work.....	4,000 00
Boys' & Girls' Clubs.....	15,000 00
Short Courses.....	18,000 00
Home Economics.....	13,000 00
Soil Analysis & Survey.....	1,000 00
Beekeeping.....	2,000 00
Killarney Demonstration Farm.....	4,000 00
Contingencies & Miscellaneous.....	1,113 11
	<hr/>
	\$ 77,113 11

SASKATCHEWAN

College of Agriculture

1. Staff Salaries—Research and Extension Service.....	\$ 19,209 49
2. Women's Work.....	7,500 00

Instruction and Demonstration

3. Co-operation and Marketing.....	1,000 00
4. Animal Husbandry.....	3,000 00
5. Dairying.....	3,000 00
6. Field Husbandry.....	5,000 00
7. Demonstration Trains.....	7,000 00
8. Agricultural Representatives.....	7,209 50
9. Veterinary Short Course.....	500 00

Elementary Agricultural Education

10. Agricultural Instruction in Public, High and Normal Schools, Household Science, Training of Teachers, Nature Study.....	19,209 49
11. School Fairs.....	7,500 00

Miscellaneous

12. Post Graduate Course in Agriculture; Agricultural Scholarships.....	1,600 00
	<hr/>
	\$81,728 48

ALBERTA

Schools of Agriculture.....	\$ 40,000 00
Women's Work.....	9,500 00
Agricultural Representatives.....	14,900 00
Poultry and Egg Marketing Service.....	2,500 00
Miscellaneous.....	65 62
	<hr/>
	\$ 66,965 62

GUIDING THE SOLDIER SETTLER

BY C. W. CAVERS, DIRECTOR OF INFORMATION, SOLDIERS' SETTLEMENT BOARD

THE system of supervision inaugurated by the Soldier Settlement Board is a forward step in agricultural progress. The Board recognized at the outset that the interests of a great many of its settlers would be advanced by the constant watchfulness and guidance of agricultural experts. Therefore, men were appointed whose business it is to direct the activities of our former soldier boys who are entering upon a new existence.

The plan has worked out in a most satisfactory way. Returned men on the land welcome the aid the Board is able to give and almost without exception they have absorbed the ideas imparted.

An illustration is furnished by the Soldier Settlement Board Superintendent at Calgary, who says: "Civilian farmers in this province (Alberta) have lost from seven to eight per cent of their stock during the winter, owing to lack of feed. Our settlers have had provision made for them in this respect and their losses are only slight." It was general knowledge last winter that there would be extreme difficulty in obtaining sufficient feed for live stock, owing to the previous year's crop shortage, but civilian farmers working independently of an organization were not always able to make provision whereby they could protect themselves against loss. The Soldier Settlement Board System, however, was a material help to its men.

Field supervisors were constantly in touch with every settler and were able to report their prospects of bringing their cattle and horses through the winter. Where feed could be procured it was sent to settlers in need of that commodity and in other cases the Board made provision for the sale or removal of the live stock that could not be fed.

Supervision carries with it numerous benefits to the new man. The

field supervisor pays a visit to a returned soldier farmer to inquire as to his welfare. Possibly the settler needs advice as to seeding operations and the expert is able to tell him how the best results may be obtained. He may be carrying too much stock; some of his cows may not be earning their feed and his chickens may be unprofitable. Where it is advisable to sell live stock or purchase labour-saving devices, or where advice is required regarding the kind and quantities of seed, the settler gets such help as the Board is able to give.

Field supervisors also are able to size up a settler within a reasonable time, and, if there is evidence that he is not going to make good, the Board immediately sets about to effect a re-adjustment by taking over the farm and finding a settler more likely to succeed. In most cases this re-adjustment is brought about without financial loss to the Board and a better prospect eventually is installed on the farm. The following figures indicate the causes leading to such readjustments—they are from one province where there have been forty-two cases in which the Board was required to intervene. Six were owing to the death of the settler; ten were due to domestic causes; thirteen men were settled on free Dominion lands and had become discouraged by the unusual weather conditions in their particular districts during the past two seasons; nine failed because of recurring disabilities, such as old wounds and illness caused by war service.

Supervision is directly beneficial and necessary to the final success of the soldier settlement scheme. For a few years, or, until settlers give evidence that they will be able to stand on their own feet and discharge their obligations, the Board will keep a watchful eye over them. During the early years this supervision must

be fairly constant—two or three visits by the supervisor in a season perhaps—but, as time goes and the settler gives proof of his application and ability, supervision will be gradually relaxed and he will be permitted to carry on according to his own ideas. It is well that he should proceed on his own initiative and the Board is careful not to destroy his ambition by unnecessary interference with his plans.

Recently in the Wilkie division, Saskatchewan, the field supervisor arranged an excursion of the settlers to the Dominion Experimental Station at Scott, where a programme of instruction was arranged. There was an inspection of the different methods of soil tillage, an experiment in harrowing growing crops, crop rotations were examined and demonstrations given in the selection of hens for winter layers, discussion on winter feeds for egg production and many other demonstrations which were bound to be profitable to settlers. Half of the eighty returned men in the district attended the demonstrations.

The Home Branch of the Soldier Settlement Board also is very active in promoting courses of instruction for the female dependents of settlers and in this way improves the home conditions of the farm. All this

helps a long way towards success. This branch has been a power for good in many ways. It happens that a great many of the returned soldiers brought back with them Old Country brides who were new to the conditions prevailing in our Great West. They needed guidance and encouragement during the winter and the Western Home Directors arranged many courses of instruction in the district towns where the farm women were entertained. This helped to dissipate the loneliness many of them felt during their first winter on a Canadian prairie farm. The office also keeps in direct touch with all of these settlers, giving them timely hints on household subjects, furnishing bulletins on such subjects as poultry raising, cooking, preserving of fruits, sewing, etc. The Home Branch is doing splendid work in making Canadians out of these recruits and helping them to feel that they are among friends in a new country. Supervision is one of the greatest constructive features of soldier settlement work. It might well be copied by civilian farm organizations in their efforts to promote the development of the agricultural industry. Such is the real community spirit, lifting up those who are unable to stand by themselves and supporting them through the early years until they are conscious of their own strength.

PART I

Dominion Department of Agriculture

EXPERIMENTAL FARMS

CEREAL DIVISION

IMPROVING THE RYE CROP IN CANADA

BY J. G. CARL FRASER, B.S. A., ASSISTANT

THE rye crop in Canada is not one of very great importance at the present time, but of late years more and more interest has been taken in it, as its worth has become better known. Here in Canada, with our extensive wheat-growing areas and good soils, we are not forced to produce rye as they are in Central and Southern Europe. In that part of the world, rye is one of the main articles in the diet of the poorer people, who use this grain almost exclusively for bread making. The straw also forms an important article in commerce for the manifold uses to which straw may be put.

In the early days of the Experimental Farms System, free distribution of rye seed had been made to the farmers interested in its production. In 1891, as many as 149 samples were sent out in this way, mainly to the Provinces of Nova Scotia and Quebec. In 1895, the Indian Head Station started sending out free five-pound samples to Western farmers, and yields of 28 bushels and more per acre were reported from this seed.

In 1903, when Dr. C. E. Saunders took over the Cereal Division at Ottawa, selection work was started with both spring and fall rye, to see if something could not be done to improve the rye crop. Four varieties were obtained: Emerald and Giant

from France, Mammoth White from the United States, and Thousandfold from Ontario. The four ryes were all winter varieties and when tested out, after the severe winter of 1904-5, Emerald and Giant were found to be winter-killed, but Mammoth White and Thousandfold came through all right and yielded 36 and 35 bushels respectively.

In 1905, Dr. Saunders brought out two ryes, one spring rye called "Ottawa Select," and a winter variety which he called "Dominion." Both of these varieties were obtained by selection. In a test that year with common rye, "Ottawa Select" produced 39 bushels per acre, as compared with 40 bushels per acre for common rye. However, from then on, the "Ottawa Select" has always produced considerably more per acre. In testing the new winter variety with two others, the following results were obtained:

Thousandfold	... 48 bu. per acre.
Mammoth White	43 " "
Dominion	... 43 " "

Through re-selection of this Dominion variety, the yield was gradually improved till in 1909, it had gone to first place in competition with Mammoth White and Thousandfold, producing 81 bu. per acre, compared with 77 and 60 bu. of the latter two respectively.

For the past few years, there have been no experiments with fall rye carried on at Ottawa, as our work with spring-sown varieties of cereals has occupied all the land. However, fall rye is being tested with good results at several of the branch Experimental Stations, especially in Western Canada.

At Indian Head both spring and fall rye has been grown since early in the nineties, and in reporting in 1916 on the rye crop, the following statement was made: "For several years, fall rye was sown early in September, and has never failed to

give a good yield of straw and grain. For fodder, pasture, or for cutting green, it surpasses all other grains, so far tested." This could also be equally well applied to our Ottawa results with this crop.

The main difficulty in improving the rye crop lies in the fact that it cross-fertilizes so readily, and great care must be taken to prevent crossing and retaining the good features once improvement has been secured.

Rye seems to be coming into its own, and there is no doubt that there is a place for rye amongst the cereal crops in Canada.

DIVISION OF BOTANY

THE NATURE AND AIMS OF FOREST PATHOLOGY

BY A. W. MCCALLUM, B.SC.F., M. A., FOREST PATHOLOGIST

UNTIL very recently the subject of forest pathology was one which in this country had not received the slightest attention, but within the past few years with the growing realization that our forest resources are not inexhaustible, as some glib-tongued persons would have us believe, and with the advent of the white pine blister rust from Europe, the necessity of initiating a study concerning the the nature and extent of forest tree diseases has been keenly felt by those concerned with the future of our forests. For forest pathology, as with the practice of forestry in general, is mainly concerned with the future and not the present. This principle is based on a recognition of the fact that the forests are not our own to do with as we please, but are simply held in trust by us to be sanely used and passed on to our successors in as good condition as possible. Were this not the case there would be no need for conservation as there is undoubtedly a sufficient supply of timber in our country to last for many years yet,

no matter how extravagantly used. During the past, and also at present, our timber resources have been utilized in a lavish manner. Before the war the per capita consumption of wood in Germany was about 15 cubic feet, in Britain about 25 and in Canada about 350. The great discrepancy of course is accounted for by the fact that ours is a comparatively new country and that we have not yet learned to appreciate the value of our natural resources. It aptly illustrates the old saying, "What's easily got is lightly prized." However, we are not unique as a people in the extravagant use of our forest resources. It is simply a case of history repeating itself. We are now passing through a stage in our development which has been passed through by all the older European countries. We are now using our forests in the same reckless manner as they did, and it is probable that only by the pinch of necessity shall we be made to realize the folly of our course. It is unfortunate that we will not profit by the experience of others, but it seems to be

generally true that we prefer to gather our knowledge in the hard school of experience.

In considering what line of work in the study of tree diseases should be undertaken one is impressed by our ignorance of nearly every phase of the problem. At the present time we do not know just what diseases are present in our forests, nor the extent to which they are present, nor their methods and rates of spreading, nor the nature and extent of the damage which they are causing, nor their life histories in full, nor the conditions which are favourable or otherwise to their development and distribution. In fact the field is practically a virgin one and of such magnitude that it is difficult to know just where to begin. It is very desirable that data upon all of the points mentioned should be secured. At present our knowledge concerning them is very hazy.

The usual statement concerning the extent of losses caused by fungi is that fungi and insects combined are annually responsible for greater

losses than is fire. This is probably true and when it is considered that each year timber to the value of many millions of dollars is destroyed by fire the economic importance of tree diseases readily becomes apparent. It is very probable that the amount of timber destroyed by these three agencies more than equals the amount which is annually cut for commercial use. The losses from fire can be reduced to a minimum as is shown by the experience of European countries in managed forests. It remains to work out methods for the control of the other two pests for the time when we shall have properly regulated forests. For at the present time under forest conditions such as prevail the control of forest tree diseases is not possible except in a very limited manner, and for small local areas. But the time is coming when we shall have scientifically managed forests and it is upon the data regarding the wood-destroying fungi which is now being accumulated that the control measures which can be applied then must be based.

APPOINTMENTS

MR. E. S. Hopkins, B.S.A., M.S., has been appointed Dominion Field Husbandman in the Experimental Farms System. Mr. Hopkins was born and reared in Victoria County, Ontario. His educational career includes studies in the Lindsay Collegiate Institute, the Ontario Agricultural College, the University of Wisconsin, and Cornell University. For a time, Mr. Hopkins was instructor in the Agricultural school at Vermilion, Alta., and, for the past two years, has been in charge of the soils investigation work carried on by the Alberta Department of Agriculture, and he comes to Ottawa from the Provincial School of Agriculture at Olds, Alta. Mr. Hopkins will be responsible, under the Director

of Experimental Farms, for planning and directing the work of crop production and rotation, cultural experiments, drainage, irrigation, farm management, and farm mechanics, both at the Central Experimental Farm, Ottawa, and at the Dominion Branch Experimental Farms and Stations throughout the country.

Mr. A. W. McCallum, B.Sc.F., M.A., has recently received the appointment of forest pathologist in the Division of Botany, Experimental Farms Branch. After graduating in forestry from the University of Toronto, Mr. McCallum spent three years specializing in forest pathology under the direction of Dr. J. H. Faull of the same university.

Mr. F. H. Reed, B.S.A., has been appointed superintendent of the Dominion Experimental Farm at Lacombe, Alberta. Mr. Reed succeeds Mr. G. H. Hutton who is now with the Natural Resources Department of the Canadian Pacific Railway. Mr. Reed was born and reared on a stock farm in York County, Ontario. He is a graduate of the Ontario Agricultural College. As a student of that institution in 1902, he won fifth place in the judging of horses, cattle, sheep, and swine at the International Stock Show at Chicago. He was, for a time dean of residence and lecturer in English

and mathematics at the Ontario Agricultural College and an agricultural representative in Victoria County. For five years he was the Provincial Representative of the Dominion Seed Branch in Manitoba and Saskatchewan. While taking an officer's training course an attack of pleurisy prevented him from going overseas. For two years he was a member of the staff of the Dominion Live Stock Branch, and, since June 1919 has been assistant superintendent of the Dominion Experimental Farm at Brandon. Mr. Reed has assumed his duties as superintendent of the Lacombe Experimental Farm.

ENTOMOLOGICAL BRANCH

WHAT IS ENTOMOLOGY ?

BY J. H. MCDUNNOUGH, PH.D., CHIEF, DIVISION SYSTEMATIC ENTOMOLOGY

THE past thirty years have witnessed an enormous expansion in North America of the agencies connected with the control and extermination of insects injurious to crops of all descriptions. Recognizing the enormous financial losses to agriculturists due to the depredations of insects the governments of Canada and the United States have mobilized forces of trained men whose business it is to devise methods to suppress these insect pests. Such men have generally been recruited from the ranks of university students of natural science and biology who have specialized in the study of insects and who for this reason are termed *entomologists*, a word derived from the Greek and meaning 'one possessing knowledge of insects'.

To a large proportion of the general public the term *entomologist* has at the present time become synonymous with that of "bug-killer", a thing that can readily be under-

stood when the practical value from the standpoint of the average citizen is taken into consideration. A man whose crop is rapidly disappearing under the insidious attacks of some minute form of life cares little for the particular name and the general classification of the insect in question, what he wants is something that will kill the insect and kill it quickly. He is exactly in the same state of mind as a man with an ulcerated tooth, or a severe stomachache; he must have immediate relief and is little interested in a highly technical dissertation on the nature and cause of the trouble. In both cases, however, it should be borne in mind, that, in order to diagnose the complaint and administer the correct treatment the specialist in question must possess an intimate acquaintance with his subject. In respect to insects this involves, among other things, a thorough knowledge of their classification, their early stages and their inter-relations to other animals

and plants; such knowledge can only be attained by years of study and where the number of forms of insect life and the diversity of their living conditions are taken into consideration (several hundred thousand different kinds of insects occur in North America alone) it becomes evident that a greater degree of specialization is necessary in entomology than in practically any other branch of natural science.

The application of this specialized knowledge in a practical manner to the suppression of insect pests is generally termed in this country 'Economic Entomology'; this name, however, is capable of misinterpretation by the non-scientist and the term 'Applied Entomology' as used in Great Britain is preferable as being more readily understood. The science of applied entomology is of comparative recent date but entomology proper or the systematic study of insects has occupied the attention of scientific investigators since the days of Aristotle and it is only through the knowledge gained during these hundreds of years of patient investigation that it has been possible for the applied entomologist to cope at all successfully with the various problems confronting him. The real man behind the guns is the research student, toiling in his quiet way in his laboratory, gaining often but little recognition but so thoroughly in love with his subject that the results obtained afford him sufficient reward. As a case in point might be cited the recent discovery of the European corn borer in the State of Massachusetts, an insect which in time, if not properly suppressed, is liable to gain as much notoriety as the famed Gipsy Moth; the attention of economic entomologists was first called to this pest by a well known specialist of Cornell University who recognized the moth and its larvae from his knowledge of European species.

In conclusion the value of an adequate National Collection of Insects cannot be too highly emphasized. The worth of such a collection has always been appreciated

by scientific men but the general public is very prone to ask what the good of it all may be from a practical and utilitarian standpoint. To this the answer is that a comprehensive and thoroughly arranged collection is indispensable as a means of quickly identifying insect material that may be causing depredations to crops. Only last year specimens of an undetermined species of jumping plant louse were sent in to the Entomological Branch reported as damaging apple trees; it was tentatively identified as the Apple sucker (*Psyllia mali*), a European pest of considerable economic importance, but no material of this species being available in the National Collection for comparison, specimens were sent to the United States National Museum at Washington. Specialists there failed to confirm the identification for a similar reason and it was finally submitted to the British Museum authorities who definitely determined it as this pest. In the meantime months had passed without it being possible to take the necessary quarantine and regulatory measures, the identity of the insect being doubtful. In the present instance this delay has not been of a very vital nature but the time will doubtless come when a similar delay will mean a severe financial loss to the country through the rapid spread of a pest under favourable breeding conditions. Such conditions as instanced above can only be obviated by an adequate National Collection of Insects in the charge of competent specialists. The late Dr. C. Gordon Hewitt, Dominion Entomologist, recognized this fact fully, and it is due to the untiring efforts of himself and his officers in this direction during his term of office that our Canadian National Collection has attained its present proportions. It is unfortunately still far from complete but given time and the necessary encouragement there is no reason why it should not eventually reach a high standard of excellence.

PART II

Provincial Government Departments

LOCAL GRAIN MARKETING FACILITIES

MANITOBA

BY L. G. MCLEOD, INSPECTOR, MANITOBA GOVERNMENT GRAIN ELEVATORS

THE Manitoba government have provided a system of elevators, which now number 130, for the benefit of farmers in the different localities to handle their grain crops. These elevators are leased to the United Grain Growers Ltd., on a rental basis, and are being operated by the Grain Growers themselves, which is proving satisfactory.

SASKATCHEWAN

BY THE HONOURABLE GEORGE LANGLEY, MINISTER OF MUNICIPAL AFFAIRS

IN The Agricultural Gazette of February, there was published an outline of the service that is given in the marketing of grain by the terminal elevators at the lake front, at the west coast at Vancouver, and also by the internal terminals at Saskatoon, Moosejaw and Calgary. All these facilities are, however, supplementary to and dependent upon the service rendered in the marketing of grain by local elevators at the interior marketing points. This form of elevator was adopted in Western Canada from the north-west wheat-growing states below the international boundary line. Their introduction into the prairies was encouraged and facilitated by the Canadian Pacific Railway Company who found the handling of the grain crop next to impossible by the ordinary method of taking the grain to the local railway station and waiting for it to be loaded on the cars direct. As soon as the improved convenience was understood and appreciated, elevators were built at practically every railway station

within the grain-growing areas of the West. At the present time, in the three provinces of Manitoba, Saskatchewan and Alberta, there are some thirty-six hundred of these elevators.

NATURE OF THE INTERIOR ELEVATORS

The local storage elevator is with few exceptions a wooden structure of considerable height being in most cases from forty to sixty feet high, the vast majority being capable of storing thirty thousand bushels each. There are a few of lesser capacity and also a few of a capacity up to sixty thousand bushels. The buildings are divided into a number of bins, usually from ten to twelve, for the purpose of accommodating the different kinds of cereals and the different grades of quality. They are always built on the property of the railway company abutting on the switch track so that the cars can be placed under the projecting spouts of the building through which the grain is passed in bulk directly

into the railway car. The loading of one thousand bushels of wheat from these elevators does not in scarcely any case require an hour, and in case of those which have been recently built, not more than one-half hour. The farmers take the wheat to these buildings in bulk in their farm wagons, draw it up into the elevator where an attachment is provided by which the wagon is partly up-ended and by the opening of a specially constructed door in the tail of the wagon, the grain empties itself into the pit of the elevator.

METHOD OF BUSINESS

By the terms of the Canada Grain Act, the owners of these elevators, or their servants operating them, are compelled to accept all grain without discrimination as it is offered by the farmer, unless the grain is wet and cannot be stored with safety. A large part of the grain taken in is bought and paid for when delivered. While the various grades may at times cause a good deal of disputation between the growers and the elevator men, it generally ends in an agreement being come to and the transaction there and then completed. A portion, however, of the grain is not disposed of in this way. Many of the farmers prefer merely to store their grain, which they can do in one of two ways. They can store it in grade, which means that the elevator man will place it with his own grain of the same grade and then deliver to the farmer a similar quantity of that grade either at the local elevator for the farmer on consignment or to the farmer's order at either of the terminal elevators.

On the other hand he can special bin it. By that is meant that he can have it put in a special bin, if a bin is available, and there kept without any other grain being mixed with it until he orders it sent forward, or the elevator man notifies him that

the special bin is wanted for other grain, and then, if, after forty-eight hours, he has not himself given instructions to have it sent forward, the elevator man, by the provisions of the Grain Act, is permitted to send it forward himself to the terminal elevator where it is stored to the order of the owner.

PROPRIETORSHIP OF THE ELEVATORS

The larger number of these storage houses are the property of private owners, sometimes individuals and sometimes incorporated companies, practically all of them being members of the various grain exchanges; most of them own seats on the Winnipeg Grain Exchange, and many of them own seats in the Calgary Exchange which does a considerable amount of business, or the Moosejaw Exchange where very little business is done. Considerable discontent was manifested among the farmers in the West at the treatment they received during the earlier years from private owners of elevators, and as a result of persistent agitation, in the year 1910, the provincial government of Manitoba purchased a large number of elevators for the purpose of carrying on directly through a commission appointed by the government, a system of public-owned elevators. This venture of the provincial government of Manitoba was not financially successful and the houses were subsequently rented to the farmers' organization, the Grain Growers' Grain Company. The agitation was equally strong in the province of Saskatchewan, and in 1911, after having had the matter enquired into by a commission presided over by Dr. McGill, a system of elevators was initiated with the financial assistance of the provincial government, while the responsibility and management was left entirely to the farmers themselves. In the following year the Government of Alberta adopted, with slight alteration, the Saskatchewan system. Both in Saskatchewan and

Alberta the government-assisted elevators have been from the commencement a financial success. In Saskatchewan, the Saskatchewan Co-operative Elevator Company, as the government-assisted line is called, has at present three hundred and fourteen elevators, and Alberta has close to two hundred and they together handle one-fifth of the grain grown in both provinces. These farmers' elevators, although mortgaged to the provincial governments for the amounts advanced for their construction, are owned by the shareholders who must be men engaged in agriculture, the number of shareholders in Saskatchewan being over twenty-two thousand. Since the farmers in the three prairie provinces have gone into the grain handling and marketing business, the old discontent has gradually died down until it may at present be said to have disappeared altogether, a result quite as satisfactory to the private elevator owners as to the farmers themselves. These grain elevators are all licensed by and under the general supervision of the Board of Grain Commissioners of Canada. Before being allowed to operate, the owners must be bonded in order to give security to the farmers using them. In addition to the general convenience, they give security to the farmer by protecting his grain from deterioration from the weather which often occurs when the grain is stored on the farm. It is not at all unusual for the farmer living within easy distance of the railway station to haul his wheat direct from the threshing machine to the elevator, an easy and expeditious way of disposing of it. One other consideration should be noted in connection with the interior elevator and this is the large amount of storage capacity available for taking care of the wheat crop. The thirty-six hundred elevators in the western provinces have an available storage capacity of approximately one hundred and ten million bushels.

OTHER METHODS OF MARKETING

The western grain grower is, however, not compelled to use the interior elevator. At nearly every station in the West, a loading platform has been erected by the railway company, the platform being built so that it is level with the floor of the railway car. The farmer who has a carload of grain to dispose of and does not wish to use the elevator may order a car from the depot agent which will be allotted him in his turn, and then the car is spotted at the platform and the farmer loads his wheat directly into the car, consigning it to one of the many commission agents that do business in the city of Winnipeg, who will attend to its grading, taking care of the out-turns and forwarding the proceeds to the farmer. Previous to the farmers themselves becoming elevator owners and operators, the loading of wheat by the farmers over the platform was carried on to a very large extent, but the large number of farmers' elevators and the high business standard their competition has created in the whole elevator business, has rendered it unnecessary to resort to this method of handling grain, and at the present time only an inconsiderable number of farmers load their grain over the platform.

THE FUTURE

While the present methods of marketing grain from the farmer to the lake front offer great convenience and advantage to the grain grower, it is doubtful if we have even yet fully solved the grain marketing question. It is becoming more and more apparent that the old method of placing the Canadian wheat crop on the market during the three or four months following harvest cannot be much longer pursued. It deranges transportation by making it necessary to maintain during a large portion of the year, an immense quantity of rolling stock in idleness which cannot

but have the effect of increasing freight charges.

As farming becomes more scientific and the annual grain crop available for shipment becomes more uniform and assured, the placing of this crop on the market of the consuming countries by regular delivery during the whole year will become a necessity

which will mean more storage capacity in the interior, because it is of the utmost importance that the farmers' outfit should be used for hauling grain during the winter months if he is to be able to devote proper attention and the necessary labour to efficiently prepare his land for grain growing.

ALBERTA

BY JAS. MCCAIG, CHIEF PUBLICITY COMMISSIONER.

LOCAL marketing services for grain in Alberta are good. Elevators have increased year by year and even in the smaller centres of the province there is competitive buying. A very effective element of competition in buying is the fact that out of a total of 853 elevators in the province 146 are owned and operated by the farmers themselves through the organizations of the United Grain Growers. In addition to the 853 country elevators there are two private terminal elevators and one public terminal elevator making 856 in the province in all. This number of elevators, together with the conditions under which they are operated and controlled through the Canada Grain Act, makes local services of a good sort throughout the province.

The co-operative habit has always been strong among the farmers and it is past the testing and experimental stage. The Alberta Farmers' Co-operative Elevator Company was incorporated in the year 1913. The Act gave the company power to construct, purchase, lease, and operate grain elevators throughout the province subject to the approval of the Lieutenant-Governor-in-Council. The head office of the company was in Calgary, which is still the headquarters of the principal farm organizations. All elevators were limited in capacity to ten thousand bushels per two thousand acres actually

seeded to grain in the year next prior to the erection of any of the elevators. The construction of these elevators was made possible through government aid. The government loaned the companies up to 85 per cent of the estimated cost of the elevators. The loan was to bear interest at 5 per cent. It was provided that twenty years should be allowed for the payment of annual instalments, the interest on the unpaid part to be paid each year besides. In the year 1917 an Act was passed enabling The Alberta Farmers' Co-operative Elevator Company to transfer their properties to the United Grain Growers, which is the name of the organization which now administers the elevators built by the Alberta Co-operative Elevator Company. The United Grain Growers is a company which is still older than the Alberta Co-operative Elevator Company, it having been incorporated under a Dominion Act in 1911. Some idea of the part played by the United Grain Growers' elevators in the marketing of grain may be had from the fact that in the last financial year of the company ending August 31st, 1919, the total grain handled by these elevators amounted to 6,162,300 bushels. And from September 1st, 1919, to date (May 15th) the United Grain Growers' Company has handled in Alberta 9,510,400 bushels.

It is not necessary to specify the safeguards in the marketing of grain provided under the Grain Act. This is not incident to local service but is under Dominion regulation. The Act takes account of the construction

of platforms, the operation of elevators, the distribution of cars, the supervision of the business of commission merchants and the fixing of grades as well as a number of other matters.

AGRICULTURAL INSTRUCTION ACTIVITIES

FROM OFFICE OF THE AGRICULTURAL INSTRUCTION ACT

IN the opening pages of this number of *THE AGRICULTURAL GAZETTE* there appear tables showing the various classes of work that will be carried on by the different provinces with funds provided under *The Agricultural Instruction Act*. The statement introducing the tables of allotments explains the principle

involved in the agreements entered into between the Federal Minister of Agriculture and the Provincial Ministers. The following articles review briefly some of the work actually accomplished in several of the provinces with these funds for the quarter ending June 30th:

PRINCE EDWARD ISLAND

CLOVER SEED

As a result of the campaign undertaken this spring to stimulate clover-seed production, one hundred and twenty-five farmers have agreed to reserve half an acre each of clover for seed. If necessary, the provincial Department of Agriculture will place a huller at the disposal of growers.

UNDERDRAINAGE

Drainage demonstrations, which were started in 1917, are being actively continued. The conclusion prevails among the farmers that underdrainage pays in this province. The demands of the work would appear to justify the purchase of a second traction ditcher. The present machine has been operated at a loss hitherto, but is expected to show a profit for the present season. The revenue from the work goes to the credit of the Agricultural Instruction account.

GROUND LIMESTONE

A deposit of limestone was investigated this spring with a view to locating a supply for grinding and distribution for fertilizing purposes. Samples submitted to the Dominion Chemist are found to contain 85.4 per cent carbonate of lime. A pulverizing machine will at once be installed.

DAIRY COMPETITION

A competition for the promotion of dairying has been organized and is proceeding favourably.

Twenty-six cheese factories and five creameries are operating at the present time.

WOMEN'S INSTITUTES

During April and the first half of May a short course in household science for soldiers' dependents was successfully carried on by the Women's Institute Branch. This was followed by a visit to each of the thirty-five women's institutes in active operation.

ELEMENTARY AGRICULTURAL EDUCATION

The school fair centres have been arranged and a poultry club organized for each. Over 3,000 day-old chicks were distributed. Twenty

Pig Clubs have also been organized and are doing excellent work in promoting an interest in this class of livestock. Approximately 40 school fairs will be conducted this season.

NOVA SCOTIA

THE work carried on in Nova Scotia under The Agricultural Instruction Act during the quarter ending June 30th, 1920, included the activities of the Agricultural Representatives, Field Crop Demonstrations, Women's Institutes, Entomological Work, Apiary Inspection, and Rural Science.

AGRICULTURAL REPRESENTATIVES

The Department of Agriculture for Nova Scotia reports that the employment of regular agricultural representatives has been discontinued for the time being, except in the county of Antigonish. The Department found it impossible to secure properly qualified men at the salary offered and therefore decided to employ seasonal men in a number of counties who were specialists in certain lines of work. Two men were placed at Cape Breton, one to promote co-operative dairying, and the other to demonstrate sheep dipping. Each has done excellent work to date. In Yarmouth County a demonstrator in potato spraying and dusting was employed, who also organized a potato growing competition in which spraying was a condition of the contest. Experiments as to the relative merits of spraying and dusting for the control of potato blight were also carried on.

Five men were employed in the province generally to carry on sheep propaganda, including assistance in the co-operative marketing of wool.

FIELD CROP DEMONSTRATIONS

This year an attempt has been made to induce farmers to enter five acre fields in the crop competition instead of one of three acres as in former years, and to have the product judged after the crop has been threshed and cleaned. It is hoped that in this way a substantial supply of improved home grown seed will be secured for 1921.

WOMEN'S INSTITUTES

The superintendent of Institutes, Miss Helen J. McDougall, reports an aggressive campaign for the promotion of women's work. The annual convention of Women's Institutes was held at Truro in June, and in July a short course for young girls was conducted at the college, which proved most successful.

ENTOMOLOGICAL WORK

Special investigations for the control of insects injurious to vegetable crops are being carried on under the direction of the Provincial Entomologist, including the cabbage maggot, carrot rust fly, onion maggot, pea moth and potato beetle. The experiments with the cabbage maggot yielded most gratifying results. The value of corrosive sublimate has been confirmed, in agreement with the experiments conducted at Ottawa, Guelph, and Vernon, B.C. Experiments have resulted in the discovery of other remedies which

appear to be superior to those used hitherto. Among them is a creosote dust, prepared at a merely nominal cost.

discovered. Instruction and inspection in modern methods of bee-keeping is going forward.

APIARY INSPECTION

The districts in which foul brood was formerly found to exist, have this year been reinspected without any trace of the disease being

RURAL SCIENCE

The work carried on under the Rural Science Department is reviewed by Mr. L. A. DeWolfe on another page of this number.

NEW BRUNSWICK

POULTRY

THE demand for eggs and chicks is reported to have been greatly in excess of the supply obtainable last spring from provincial sources, and importations were necessary. In all, 6,586 hen eggs and 1,090 day-old chicks were distributed.

LIVE STOCK

The work carried on during the spring months by the Live Stock Division, with the assistance of the agricultural instruction grant included the following:—

Demonstrations in, dipping, docking, shearing, etc., of sheep; co-operative wool-marketing; boy's Pig club organization; stallion inspection.

SOILS AND CROPS

The work of the Soils and Crops Division included (1) clover-huller demonstrations, (2) underdrainage demonstrations, and (3) demonstration plots of forage crops for silage.

The clover huller was at the disposal of any agricultural society or any group of five farmers having ten acres of clover hay for threshing. The machine was operated at a fixed charge per hour. Half rates for the transportation of this machine were obtained from the railway. The output was 20,000 pounds of seed.

The traction ditcher was demonstrated, and surveys were made for 28,000 feet of tile, together with plans and estimates.

The purpose of the silage plots is to ascertain the suitability of certain crops for different districts and the cost of growing and ensiling same. From the data secured, it is hoped to place before the dairymen a solution of the increasing cost of milk production and to promote the introduction and the use of the silo.

WOMEN'S INSTITUTES

Demonstrations in the food value and practical uses of milk were given throughout the French-speaking districts, similar to those previously conducted elsewhere in the province.

The short courses in cookery, millinery and nursing, carried out in the early months of the year, were popular and well attended. Two junior institutes were organized.

AGRICULTURAL REPRESENTATIVES

For this work the province is divided into four groups of counties with a local representative for each. The work varies somewhat in each district, assistance being given in carrying on the lines of work supervised by the several divisions of the

department, as previously indicated, including sheep and wool demonstrations, acre profit and field crop competitions, the promotion of bull clubs and cow-testing associations. Other activities included judging at seed fairs and assistance to the Farm Settlement Board. A combined Field Crop and Cleaned Seed Competition for oats and potatoes was organized in the county of Westmoreland.

ELEMENTARY AGRICULTURAL EDUCATION

The Director of Elementary Agriculture and his assistant report 111 visits to schools in connection with the organizing of home plots, poultry clubs, and the supervision of agricultural teaching. Seed distribution to school children comprised 4,523 lots of seed, and 1,009 dozen eggs were sent to school poultry clubs with full instructions for hatching and rearing.

MANITOBA

THE extension work carried on under The Agricultural Instruction Act in Manitoba includes more particularly the activities of Agricultural Representatives, Women's Institutes, Boys' and Girls' Clubs, and work to extend and improve the Poultry Industry.

AGRICULTURAL REPRESENTATIVES

The agricultural representatives demonstrated in an impressive manner their usefulness and value in the country in cases of emergency when the grasshopper outbreak threatened crops in Manitoba last spring. The work of arranging for supplies of seeds, eggs and pure bred live stock was barely completed when the representatives were called upon to organize and direct the effort to control this outbreak, and by so doing saved many times the amount paid in salaries and expenses.

At four points in the province the representative undertook for the first time the secretarial work of the local agricultural society, obtaining double the usual number of members and exhibitors, which goes to show that under active arrangement these societies may be made far more effective than at present in advancing agriculture. Successful summer fallow, standing field crop competitions and ploughing matches were promoted in each district.

WOMEN'S INSTITUTES

The spring courses in dressmaking and millinery were attended by over six thousand persons.

The Women's Institute advisory board met at Winnipeg in April for the discussion and planning of Institute work. During June, eighteen very successful district conventions were held. The Department provided two speakers for each convention. At the evening sessions, community advancement was emphasized. The total attendance was 3,500.

A very gratifying circumstance connected with all these gatherings was the co-operation of other organizations, such as the United Farm Women, who were invited to share in them. Several institutes have this year equipped school playgrounds, and many others are assisting the boys' and girls' clubs.

BOYS' AND GIRLS' CLUBS

The training of demonstration teams in canning and drying constituted the chief line of effort in the girls' section during the spring months. The employment of demonstration teams is a new method of teaching housekeeping methods. A team consists of three club members, a captain and two assistants,

each of whom is engaged in one or more of the club projects. The members of the team acquire in this way the ability to speak in public and to convey to others what they have learned. For the instruction of the teams, four teachers with second class certificates and four years' training at the Agricultural College were secured.

In addition to the training of demonstration teams, demonstrations and lectures in sewing, canning and cooking were carried on in the "New Canadian Settlements," in conjunction with the Department of Education.

In the boys' club section the spring season was devoted to organization work. Some fifty-six meetings were held at which the aggregate attendance was 2,000 children and 1,280 adults. Films intended to stimulate an interest in club work were shown at thirty-one of these meetings.

In co-operation with the Dominion representative in charge of cow-test-

ing, 14 clubs, with 180 members and over 1,000 cows, undertook this work. Cow-testing teams were trained to give demonstrations.

Two Boys' and Girls' Club bulletins were issued, 6,000 copies of each being distributed to schools, banks and persons interested in club work. Club charters were mailed to over 1,000 branch clubs.

POULTRY WORK

With a view to improving the prevailing system of egg marketing, preliminary investigations were conducted by the Poultry Superintendent. It is proposed to draft legislation dealing with the matter similar to that in force in Saskatchewan. A course of lectures was given to the students at the Brandon Normal School on breeding, feeding and marketing. The practical work connected therewith consisted of operating an incubator, identifying breeds, and candling eggs.

ALBERTA

IN the Province of Alberta the schools of agriculture constitute the principal activities carried on under The Agricultural Instruction Act. These schools closed for the summer at the end of March. There is also the Agricultural representative work and the work of the Women's Institutes.

AGRICULTURAL REPRESENTATIVES

The Department of Agriculture this year continued its agricultural representative policy, locating men

in various parts of the country to look after such matters as school fairs, calf, pig and poultry clubs, the organization for growing and marketing potatoes and in any way possible to assist the farmers.

WOMEN'S WORK

Ten travelling lecturers were employed during May and June giving one to three day courses at Women's Institutes. The courses included household science, sewing and nursing.

THE MOTION PICTURE IN AGRICULTURAL EXTENSION WORK

PRINCE EDWARD ISLAND

BY W. J. REID, B.S.A., DIRECTOR OF AGRICULTURAL INSTRUCTION

WE have not been in the habit of using anything but picture slides for our departmental work. We purpose purchasing a moving picture machine for the

coming winter season, and also to make arrangements for the use of slides through the bureau established for that purpose in Toronto.

NOVA SCOTIA

BY DR. M. CUMMING, SECRETARY FOR AGRICULTURE

THE Nova Scotia Department of Agriculture has procured some motion picture machines, but up to the present time we have been largely depending upon the Ontario Department of Agriculture and similar institutions for borrowed films. We appreciate the generosity of the Ontario Department which have permitted us the temporary use of loaned films and the privilege of obtaining duplicates of those that we desire. This summer we are having pictures taken in Nova Scotia, and hope to have a

satisfactory programme for next year's agricultural extension work.

In carrying on our extension work with motion pictures we have had the co-operation of the Dominion Atlantic Railway Company, who are taking a special interest in the development of agriculture along their line. During the past winter they made a special feature of exhibiting motion films in almost every district along the railway. The Company is assisting the Department in preparing films for future use.

NEW BRUNSWICK

BY E. P. BRADT, B.S.A., SECRETARY FOR AGRICULTURE

WE have not yet commenced the use of motion pictures in extension work, but are making plans to do so. It is our intention this coming autumn to purchase two or three lantern outfits, together with a number of reels of film, this outfit to be used by our agricultural representatives and other members of the staff at meetings which will be held during the fall and winter months.

In all probability, a start will be made in the preparing of local films next year. We have in mind at the present time the preparation of two special New Brunswick films, namely, that of the care and management of sheep, and potato growing. Other local films will be prepared from time to time. When we first start our programme of introducing motion pictures, we will have to depend upon the films prepared by other provinces. Many of these can be used to good advantage in New Brunswick.

SASKATCHEWAN

BY W. E. H. STOKES, ASSISTANT EDITOR OF PUBLICATIONS

THE Saskatchewan Department of Agriculture makes a fairly extensive use of motion pictures, some of which are of size for use in the regular theatres, while others are adapted for use in the Pathescope. They have been found most useful for lectures in the Better Farming Train and the Dairy Instruction Cars, which annually tour the province. At Teachers' Institutes and other meetings and also for use in Boys' and Girls' Club work they have been found invaluable as a means of seizing the attention.

Illustrating all phases of the grasshopper campaign 1,000 feet of moving picture film have been taken by this department and these pictures will be used as educational propaganda on the Better Farming Train and at meetings at country points. The series starts with a picture of a map illustrating the infested areas in 1918 and this year. Field directors are shown holding an organization meeting; and the Minister of Agriculture is depicted signing orders for the huge amount of supplies which were used for poisoning the insects. The picture also shows the movement of supplies to the scene of hostilities, their distribution, and the mixing of poison bait. It shows how the bait was spread and piles of grasshoppers lying dead in the fields a couple of days later.

The picture terminates with an illustration of female grasshoppers depositing their eggs in preparation for the next year's hatch and a farmer plowing his land deep in the fall, turning down the eggs so deep that they will not hatch.

The Department of Agriculture has films entitled as follows: "How to Select a Good Beef Animal"; "Dairy Instruction," parts 1 and 2 "Victory Loan," parts 1 and 2; "Mixing Concrete," parts 1, 2 and 3; "Whats under the Fleece?"; "Through Life's Windows," (lessons on the care of the eyes); "Greater Production;" "Clearing Land with Gun Powder;" "Co-operative Livestock Marketing," parts 1 and 2; "Grain Growers' Patriotic Acre;" "Magic Kitchen."

The Game Branch has "The Bird City" in two parts showing the nests and habits of many Saskatchewan waterfowl, and also three comic films.

The Department of Education has a film for both the standard and Pathescope machines on "The Education of the New Canadian."

The Bureau of Public Health has "Error of Omissions" Fit to Fight", and "Venereal Diseases, Their Origin and Results," and also "The Long vs the Short Haul", the latter covering the subject of milk production and preservation from contamination.

POULTRY CULLING

PRINCE EDWARD ISLAND

BY CYRUS POIRIER, DOMINION POULTRY REPRESENTATIVE

POULTRY culling was started in Prince Edward Island in 1918.

At that time a house to house system of culling was inaugurated, that is a man was sent to each farm and culled the flocks. We soon found that this method was impracticable and in 1919 we began poultry

demonstrations. Each demonstration is advertised in the section of the country affected, and an officer of the Poultry Division gives the instructions to the assembled farmers. We generally endeavour to spend two or three hours with the people and by that time the interested ones

are able to cull their flocks very satisfactorily.

So far, we have held twenty-four culling demonstrations in this province during the present year, and we have about fifty applications on hand in the office. It is no trouble to train the farmers to cull their own flocks as the system is very simple. In the

first year of our operations the percentage of unprofitable birds was about forty-five per cent. Now in the flocks that are being culled for the third year in succession, we find the percentage to be about twenty per cent, which is a marked improvement.

NOVA SCOTIA

BY J. P. LANDRY, MANAGER AND LECTURER

THE culling of farmers' flocks of fowls has not been systematically undertaken by the Nova Scotia Department of Agriculture. We propose this August to undertake in four counties of the province

a systematic plan of going from farm to farm and culling the undesirable birds. This will be carried out to the extent that competent help is obtainable.

MILKING THRICE DAILY

FROM the experiments of dairy farmers, especially those conducting tests in the Record of Performance and Record of Merit, it would appear that high producing cows can be induced to give more milk in three milkings than if milked twice in the twenty-four hours. As far as could be ascertained, the Experiment Stations have not put this method to an exhaustive test, but at certain of them fairly conclusive evidence has been secured that under certain conditions it is profitable to milk three times daily. At Macdonald College it is considered by Professor Barton that it is profitable from the standpoint of economy and safety that a cow giving 60 lbs. of milk or more a day should be milked three times. At the Nova Scotia Agricultural College

five different cows were milked three times daily for one month and then dropped to twice daily the succeeding month. The reduction in the amount of milk was found to be not much greater than was to be expected as a normal drop due to the advanced period of lactation. The cows had been milked from two to three months when the test was commenced. At the Nova Scotia station, Professor Trueman pointed out that the cow Emma of Evergreen 2nd milked twice a day gave as high as 17,000 lbs. during the year. Professor Trueman concludes that unless the udder is over-distended there is little or no advantage in milking oftener than twice daily. Professor Trueman agrees with Professor Barton in concluding that it is advantageous to milk three times a day cows that are giving upwards of 60 lbs. of milk.

ONTARIO

BY WADE TOOLE, B.S.A., PROFESSOR OF ANIMAL HUSBANDRY

THIS year we have cows on test that are being milked three and four times per day, but we have no experimental work to report. We figure that a cow giving

60 to 65 pounds should be milked more than twice per day. There is no doubt but that frequency of milking stimulates milk flow, but just how far this proves profitable I cannot

definitely say. The following figures this summer may be of interest:—
on three cows which have been on test

Name of Cow.	Average Production per day 1st five days in June, milked three times daily.	Average Production following five days in June, milked twice per day.
Princess Korndyke Fayne.....	60.94 lbs.	51.76 lbs.
Fairmont Dewdrop Lanore	71.6 "	62.86 "
Una Hengerveld Lyons.....	68.94 "	58.4 "

These figures show a drop of 9.18 pounds, 8.74 pounds, and 10.54 pounds, per day respectively.

Of course this is not sufficient work

from which to base any definite conclusions. We hope, however, to be able to get some interesting figures on this subject another year.

ONTARIO

RESULTS FROM CO-OPERATIVE MARKETING

AT the conference of agricultural representatives held at the Ontario Agricultural College in July, Mr. G. R. Green, agricultural representative for Oxford County, presented an outline of the results that had been achieved in that county from the co-operative shipping of live stock and the handling of eggs.

RESULTS FROM CO-OPERATIVE SHIPPING

1. Increased prices for all kinds of live stock, particularly calves and beef cattle.

2. The average farmer does not follow market conditions closely enough, and is not sufficiently familiar with the grading of cattle to sell them to a buyer close enough to protect his own interests.

3. The same statement applies where cattle are sold by weight.

4. There is a vast difference in price between the high and low grade stuff when sold in a co-operative way, as compared with the prices that were paid on all grades of stuff previous to the beginning of co-operative shipping. Or, in other words, it would appear as though the practice of the drovers

in the past was to shave a good margin off the high-priced animals, and apply it on the purchase price of the low grade stuff, in order that better feeling might prevail among those from whom the stock was purchased with the natural result that there was very little encouragement for the men who had high class animals.

5. Co-operative shipping has been extremely educational, inasmuch as the men are learning that it is a very easy matter to sell a high class article for a good price, and that it is a very different and more difficult matter to sell a low grade article.

RESULTS OF THE CO-OPERATIVE HANDLING OF EGGS

1. An exceptional advance in price to a figure which has not been equalled or surpassed by any produce dealer in the county.

2. An altogether different attitude prevails in our Egg Circle districts. People are now keeping hens as a business proposition, and not merely for the convenience of the household.

3. The poultry is better housed and fed.

4. More poultry is being kept on the average farm.

5. The quality as well as the quantity has shown a vast improvement.

COUNTY CO-OPERATIVE ASSOCIATIONS

LANARK COUNTY

BY FRED FORSYTH, B.S.A., AGRICULTURAL REPRESENTATIVE

IN the County of Lanark a co-operative association has been formed to handle the work previously taken care of by the egg circles. It was found necessary to improve on the egg circle system in order to develop the poultry industry in a different manner. The County Co-operative Association which was started last autumn has as its primary object the handling of eggs and poultry on a graded basis. The organization is composed solely of farmers, and is financed by the collateral note system. They have a charter under the Ontario Companies Act and an executive elected from their membership, who in turn

have engaged a manager who looks after the business of the association. For the purpose of the association the farms of the county are divided into some 18 centres to which the farmers bring their eggs and poultry once a week. A collecting truck operated by the association calls at these various centres to gather the eggs and poultry to be delivered to the central candling and grading station at Perth. Here all the eggs are candled, graded, government inspected, and sold on a quality basis. The success being achieved with the eggs and poultry warrants the belief that it will not be long before other products of the farm are handled in a similar way

VINELAND PRUNING EXPERIMENTS

BY E. F. PALMER, B.S.A., DIRECTOR

AN experiment consisting of a comparative test of three different pruning treatments was started at Vineland in 1914. The three treatments were (a) winter or dormant pruning, (b) summer pruning, and (c) no pruning. The orchard under test consisted of about fifteen different varieties of apples. Although it is too early to look for conclusive results especially on the ultimate yields of the various systems of pruning, yet we have indications of what these results will be. Also we have data which positively shows the advantages of light pruning for the young orchard. Beyond this our results do not go as the orchard is still young.

The experiment, as originally outlined, specified the following for each kind of pruning.

Winter Pruning.—Trees to be severely cut back, thinned out in March or April, the object being to form a framework pleasing to the

eye and which, at the same time would ultimately be capable of carrying a maximum load of fruit, i.e., to be pruned according to the then commonly accepted method for young trees until bearing age. Fruit bearing was not to be taken into consideration for at least seven years.

Summer Pruning.—The trees under this treatment to be well thinned out in August when growth is ceasing and the maturing of wood commences. Terminal growths to be cut back only sufficient to keep the tree within bounds which usually involves only tipping back the main branches. The original objects of this type of pruning were to promote early bearing, admit as much sunlight as possible and at the same time not sacrifice the natural shape of the tree any more than necessary.

No Pruning.—Trees left to make natural growth with the exception

of the removal of broken or otherwise injured limbs.

SUMMARY OF RESULTS

(1) The heavy dormant pruned trees have made much less growth as indicated by the diameter of the trunk and spread of branches than either the unpruned or summer pruned trees. Moreover, the summer pruned and unpruned trees have been bearing fruit since 1915, which would lessen their ability to make new growth. Their real gain over the heavily pruned trees is, therefore, greater than the actual measurements would indicate.

(2) The dormant pruned trees have been much later in coming into bearing, producing in 1915 only three pounds of fruit for the whole block, as against 127.7 pounds for the summer pruned block, and 209.4 pounds for the unpruned block. With the season of 1919 and those intervening between 1915 and 1919, the ratio has been practically the same. Heavily dormant pruned trees have barely started to bear as yet, while the summer pruned and unpruned trees have increased in productiveness each season.

(3) The summer pruned trees (probably equivalent in effect to light dormant pruning) have made considerably more growth than the heavily pruned trees and have practically held their own with the unpruned trees except in the case of the Greening variety where the unpruned trees have out-distanced the summer pruned trees.

(4) Unpruned trees have made more growth than either of the other two systems, though very little more than the summer pruned trees. They are also continuing to outyield the other systems of pruning. These unpruned trees, however, as a whole are becoming very dense, increasing

very materially the difficulty and cost of spraying, picking, etc. There are indications also that the fruit is falling off in colour due to the dense growth. This density of growth of course varies with the variety, the Spy being very thick and bushy, while varieties such as Wealthy and Duchess are quite open. Even these varieties, however, lean badly from the prevailing wind, due to the resistance offered by their unchecked growth.

CONCLUSIONS

From the above, therefore, it is evident that the lighter the pruning the greater the growth, the earlier the tree comes into bearing, and the heavier the yield during the early period of the tree's life at least. But although the unpruned trees have made the greatest gains to date, the lightly summer pruned trees are very little, if any, behind, especially when the increased cost of spraying, picking, growing lack of colour, and the general undesirable condition of the tree for future crops are considered. To redeem such an unpruned orchard would necessarily retard its crops for a period and thus the earlier gains from no pruning would be lost.

Light annual pruning just sufficient to retain the proper shape of the tree to allow sunlight and air to get through and to keep out all crossed and broken branches seems, therefore, to be the proper method to pursue for the young orchard until it comes into bearing. After bearing age is reached, pruning will likely have to be more severe so as to maintain a proper supply of new wood each year. What constitutes severity of pruning will of course, vary with the variety.

SASKATCHEWAN

DAIRY COWS PURCHASED

ONE hundred good young grade cows and heifers are being purchased in Eastern Canada by the Saskatchewan Government as a further measure for encouraging the development of the dairy industry in the province. It is estimated that these animals will cost \$10,000 and they are to be resold on easy terms to bona fide dairy farmers in the various dairy centres of the province. Only farmers now engaged in dairying or who are entering the dairy business and will agree that

all cows purchased from the Department of Agriculture shall be bred to pure bred sires of the same breeding can secure these cows.

It is becoming increasingly difficult in both Eastern and Western Canada to secure Shorthorn cows or heifers of a good milking strain. Mr. A. J. Clark of the Live Stock Branch who is selecting and buying the cows for Saskatchewan will endeavour to buy every good milking Shorthorn he can secure at a reasonable price. The balance of his purchase will be Holsteins and Ayrshires.

NEW APPOINTMENTS

PROFESSOR Manley Champlin, M.S., has been appointed Senior Professor of Field Husbandry succeeding Professor John Bracken, who is now President of the Manitoba Agricultural College. Professor Champlin is a graduate of the College of Agriculture at Brookings, South Dakota. For eight years after graduating Professor Champlin was in charge of the farm crop teaching and investigation work at Brookings. He also did extension work. Before coming to Saskatchewan, Professor Champlin had charge of the extension work in South Dakota.

Professor L. E. Kirk, B.S.A., a graduate of the University of Saskatchewan, has been appointed Assistant Professor of Field Husbandry at the University of Saskatchewan. To accept this position, Professor Kirk left the Moose Jaw Collegiate Institute where he was teacher of elementary agriculture.

Professor L. M. Winters, B.A., who was a teacher of animal husbandry in the Iowa State College, has been appointed Assistant Professor of Animal Husbandry. Professor Winters is a graduate of the University of Minnesota, and has his master's degrees from the Iowa State College.

"I and the other members of the Imperial Press Conference were very favourably impressed with your agricultural colleges and experimental farms. You have no greater asset in the Dominion."

*Sir George Starmer,
Editor of the Northern Daily Echo.*

PART III

Junior Agriculture

DEMONSTRATIONS, COMPETITIONS, AND CLASS-ROOM STUDIES IN RURAL LIFE FOR BOYS AND GIRLS

RURAL LIFE AND THE RURAL SCHOOL

BY J. B. REYNOLDS, M.A., PRESIDENT, ONTARIO AGRICULTURAL COLLEGE

A NUMBER of Summer Schools for teachers were held in July at various points in Ontario. Those in attendance were mostly rural school teachers, and the object of the courses was to make the rural school a more effective instrument in country life.

This effect can be brought about not so much by the subject-matter of the teaching as by the spirit and atmosphere of the school and the attitude towards rural things. The teaching of agriculture is not the main issue. The amount of agriculture that can be directly taught in the public school is comparatively little, and for two reasons: Not much time can be given directly to agriculture after due allowance is made for the foundation subjects of reading, writing, arithmetic, grammar, history, geography, drawing and literature; and no means have yet been found to give the public school teachers sufficient knowledge of agriculture to enable the subject to be taught effectively as a separate subject. For a teacher to be capable of covering the subject as a whole even in the most superficial way is not to be thought of after one month of training. Certain teachers may develop certain hobbies such as nature study or the school garden; one may be an amateur botanist and interest the school in collecting weeds and grasses; one may make collections of insects; another may lead the school in making a survey of the crops grown in the school district, or

the breeds of live stock. These and other studies are important contributions to the study of agriculture, and may be followed to great advantage as diversions from the regular school courses.

THE RIGHT ATTITUDE

But all this is of little avail in re-enforcing country life unless the teacher herself or himself has the right attitude towards country life, realizes something of the importance of agriculture as a science and as an art, and something of rural values as distinct from urban values. Whatever knowledge of agriculture the teacher may or may not gain in these short courses, and at the best that knowledge must be small,—the purpose of the courses is attained if the point of view is caught.

It requires some insight and imagination to get the effect. A month's residence at an agricultural college should convince any one, with a reasonable gift of observation and imagination, that here is something big, something tremendous. These numerous buildings, these laboratories and classrooms, barns, gardens, fields of grain and herds of stock, this large staff of teachers, professors, and investigators—what is it all about?

That hundred-acre mixed farm out in the country, the problems it thrusts day after day upon the man who is working it; the farm home associated with it, and its problems

of work and leisure, recreation and social life; the rural community; these form the justification for the agricultural college and all its works. When this is clearly seen, some idea is gained of the significance of that hundred-acre farm, the farm home, and the rural community, in the well-being of the nation.

THE SEEING EYE

The teacher who hopes to take a right place in the life of the country school district must cultivate the seeing eye and the understanding heart for persons and things rural. The usual, popular, melodrama, comic supplement, moving picture conception of the farmer and of country people must be forgotten. It is essentially and perniciously false. The farmer is something of a humorist, and takes delight in deceiving the simple-minded by a somewhat unfinished exterior. The city-bred person makes the fatal mistake of judging by outside appearances. To the city-trained eye there are two classes of persons, one wearing overalls and the other wearing white collars. The former class work with their hands. The latter class work with their brains. That is the superficial judgment, which ignores the fact that there is a very great deal of clear, hard thinking done to-day by the men wearing overalls. At any rate, the farmer belongs to both classes. The more he understands of those discoveries, which it is the business of the agricultural college to make, the more he absorbs the teaching which it is the business of the college to spread abroad, the better farmer will he be. In order that the teacher may acquire the insight to find the real farmer in the puzzle, it is necessary to realize how large are the intellectual demands which his occupation and his business make upon the farmer of the present day. With this realization comes a new respect and admiration for farming and

farmers. That is the first step toward the right point of view.

COUNTRY LIFE INTERESTING

The second discovery the understanding teacher will make is that farm work and country life are interesting. I do not mean interesting as a novelty and a casual spectacle to the visitor. I mean interesting to one doing the work and living the life. There is nothing that more clearly distinguishes one person from another than the quality of things that interest the mind and please the fancy. "Tell me what you like," says Ruskin "and I will tell you what you are." Of course, it may mean nothing to some persons to be told that country life is interesting. They simply do not believe you, or, more correctly perhaps, do not understand you. It is the case of Abraham Lincoln's alleged endorsement of a doubtful show. "For those who like that kind of thing, it is just the kind of thing they like." With respect to farm work and country life, one may put the case variously thus: to rightly trained and educated people, farm work and country life are interesting; or, it is entirely worth while so to cultivate one's tastes and desires as to be interested in country life. That farm work furnishes abundant material with which to interest the trained mind is undoubted. It is monotonous only to the dull and the uneducated. No kind of every day experience affords greater variety than farm experience.

If we wish to indicate two distinct types of mind that are interested in quite contrary types of things, we may describe them as city-minded and rural-minded. The city-minded person demands the thronging crowds, the high lights of the streets, the unusual, the spectacular, the sensational. These are his marvels. The rural-minded person finds his marvels in the commonplace, in the things that happen every day,—the rising

and the setting of the sun, the shifting forms of clouds, the wonders of generation and birth and growth; the control of natural processes by human intelligence and skill. Farm life may be relatively unprofitable and arduous and therefore uninviting to those who seek ease or large profits. But it is interesting. This also the teacher who wishes to fit into the country picture must learn. To learn it, there must be developed "The disciplined habit to see."

GROWING URBAN INFLUENCES

For a full generation the national life in Canada, in its thinking and its aims, has been marked by the growing influence of the towns and cities. Rural values have diminished, rural mindedness has been scorned. So much is this so, that rural values are not accepted even

in the country, and people living in the country have become too much inclined to accept and adopt city standards in all things. That the change has been for the good of the nation, no true patriot will claim. Industry, thrift, prudence, intelligence, resourcefulness, sanity of judgment and steadiness of conviction are qualities of character essential at all times to the well-being of the nation, and particularly needed now. These qualities are best produced under the conditions of country life. But so greatly has the town influence increased, that only the shrewdest and clearest-sighted of country people have not bowed the knee to Baal. What one needs is respect for and faith in one's occupation, and satisfaction in one's way of living. Let the teachers find this point of view towards the farm and country, and become to the country schools worthy apostles of a worthy gospel.

MANITOBA

BOYS' AND GIRLS' CLUBS

FROM PROGRAMME OF STUDIES FOR THE SCHOOLS OF MANITOBA

THE home activities of the children constitute the work of the Boys' and Girls' Club; these home activities or duties form a large part of the the education of children, particularly in rural communities. They have now been organized and given a definite value.

This part of a child's education should be recognized by the teacher and related to the ordinary work of the school. The relation of these hitherto different lines of work will give life and purpose to each. There is no subject on the programme that cannot be vitalized and humanized by the experiences of the home. Materials for problems in arithmetic will grow out of the calculations necessary for the different kinds of

work taken up. The child's records of his different activities help his composition, spelling, and writing. Literature lends itself to idealizing the work. It is, of course, a part of nature study. History and geography will come in if advantage be taken of the material at hand.

Club work in its nature is individualistic and material. The school stands for high ideals of life both in the individual and in the community. Thus if the home and the school be drawn together in the manner outlined above, the child's life will be broadened, right habits will be formed, elements of character fixed, and the way opened for a higher type of manhood and womanhood.

ALBERTA

UNIVERSITY WEEK

BY IRENE FARLEY

THE University Week for farm boys and girls has come and gone, leaving many newly awakened ambitions in the minds of the young folk from our Alberta farms, who were privileged to attend.

"If I can possibly work it, I mean to come back to the university to take the course in scientific agriculture" was a remark heard frequently among the groups of both girls and boys, as they discussed the lectures, or compared their notes. Should these ambitions fail to materialize through stress of circumstances, however, the awakened interest in intelligent farming methods, the enlarged vision of citizenship, the appeal to the social and aesthetic side through residence in the university buildings, cannot fail to have a very marked influence on our rural life. A delegation of only one hundred of our future citizens, the future fathers and mothers of Alberta children, passing through the university each year for even one short week, has possibilities as yet hardly realised except by those most interested.

We are fortunate in Alberta in having an Extension Department to our university which holds up a very high standard of service to the rural life of the province, and only lack of sufficient funds prevents it enlarging the scope of its work, I might add that in all its work for the rural people it is splendidly supported by the faculty of agriculture of the university, and perhaps the unselfish service given by the whole staff throughout these yearly conference weeks, is in itself one of the most valuable lessons in spiritual values that the delegates receive.

While the attendance this summer was not so large as had been hoped for, on account of the disastrous conditions of the last year in so many

portions of the province, yet something over one hundred delegates registered. These were drawn from every corner of the province from farthest north, to farthest south, and were a fine representative sample of the type of young people who are growing up to become the true "Canadian" for whom some of our writers have been searching apparently without success up to the present time. There can be nothing more helpful to develop this typical Canadian than these university weeks which bring together, with a common interest, boys and girls of every nationality. To hear the roll call of the delegates, was to find most of the countries of Europe represented, and in this gathering one found the true League of Nations with all racial and religious feuds at rest. On the soil, and in our universities, if they have right leadership, will the foundations of a real Canadian race be laid.

Those older people who attended the conference and were interested in the building of our country, saw great hopes for its future in the common sense, the good-natured tolerance, the open-heartedness and the keenness for increased knowledge among the young people who were in attendance. Not the least significant feature was the attendance of one young mother whom most of us thought to be a child of some sixteen or seventeen years, until we learned that she was a married woman of nineteen with a small child of fourteen months. The child was being safely cared for by a friend while the little mother, whose home was in one of the drought-stricken areas, came to the university to gather all the information she could for the better management of their farm, and proved herself one of the most industrious and intelligent of the students.

The programme, which had been prepared with a great deal of careful thought, so that the greatest amount of value might be given in the short period of a week, consisted of a series of talks at the commencement of each morning's session, on spiritual values, by a returned chaplain, after which came a splendid series of practical lectures on Field Husbandry by Professors Cutler and Newton, followed by a series by Dean Howes on the History of Agriculture from the old Roman days, from which our modern Canadian boys and girls learnt how highly the profession of agriculture was held in days gone by, and that no less a man than Xenophon described it as "the most fitting employment for men of honourable birth."

The afternoons were given up to nature study out of doors as far as the weather man permitted, and for this work outside helpers were called in to take charge of different groups. Among those who were kind enough to undertake this voluntary service were Mr. Whitehouse, President of the Alberta Natural History Society, who has done much valuable research work in the province with

insects, Mrs. Cassels and Mrs. Root, also of the Natural History Society.

No one could have doubted the enthusiasm of the young folk who had seen them rushing off in the pouring rain to a stock judging lesson in the stock pavilion at the university farm, or seen them return drenched to the skin, but in the highest spirits and full of interest in the stock they had seen, and all they had learned.

A happy and instructive week ended with a field day, and a banquet at which all the faculty of agriculture and their wives were present, and the Premier of the province was the guest of honour.

No such short account of the week can give any adequate idea of its value or just how much it meant to those who attended, nor is it possible to give any idea of the amount of thought and work given to its successful organisation, by the Director of the Extension Department, Mr. Ottewell, and his helpers, Miss Montgomery the librarian of the Extension Department and Mr. Cameron, but that the results they achieved were fully appreciated by all those who were present there can be no shadow of a doubt.

"Educational contests are known to do much to broaden the knowledge and viewpoint of contestants. The boy who takes part in a pig contest is developing a nucleus of good citizenship. He is not content with the selection of his animal alone, and the proper care and feeding of it, but secures and studies under the supervision of a teacher of vocational agriculture all available literature regarding pig management; he begins to see the possibilities in the proper selection of the animal, especially with respect to purity of breed; and he endeavors to secure these conditions by studying the 'leaks' in pig management methods and strives to overcome them. He learns the essentials in an ideal hog, and gets much practice in the scoring of his particular animal or animals. He not only tries to grow his hogs at a minimum of cost but he also tries to become more proficient in pig management, and to extend his knowledge of the various phases of swine husbandry. The knowledge acquired is given a practical application and the boy is taught the value of his individual studies in such a way that he does not fail to follow the same methods in other lines of endeavor."

From the Vocational Summary.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications, and Notes

FARMERS' CONFERENCE AT SWIFT CURRENT

The conference of farmers held at Swift Current during the second week in July was called together to consider ways and means of carrying on profitable agricultural pursuits in the semi-arid areas in the south-western section of the Canadian prairies. The climatic conditions prevailing in the south-western part of Saskatchewan during the past three years led to this conference, which was suggested by Geo. Spence, M.L.A., and carried out by the Hon. C. M. Hamilton, Minister of Agriculture, and F. H. Auld, Deputy Minister.

Addresses were given by professors of the College of Agriculture, University of Saskatchewan, and professors from agricultural colleges and experimental stations in North and South Dakota, Minnesota, and Montana, where the rainfall is practically the same as in Saskatchewan, and where they have for years been experimenting in soil cultivation rotation of crops, and growing grasses and legumes so as to counteract the dry seasons and therefore make farming operations successful. Besides arranging for addresses by these professional men the Minister and his deputy provided for one-half of the programme to be devoted to the experiences of practical farmers in the dry districts. Owing to the importance of the conference, of the value of suggestions made, and of the information gathered, it was decided that a pamphlet, containing addresses and general information, should be published by the Saskatchewan Department of Agriculture.

SUBSTITUTES FOR SUMMER FALLOW

The big problem facing the farmers in this district is the supply of moisture. Recommendations were made for the conservation of soil moisture. It was pointed out that summer fallowing both conserves moisture for the following year and destroys weeds. Some speakers contended that the bare fallow was expensive, too much humus being burned by the heat of the summer sun. In Dakota the bare fallow has been discarded for a cultivated crop. In the majority of cases corn is the cultivated crop and cultivation of corn is the summer fallow, and the following year wheat or some other cereal is

grown which practically gives the same results as if grown on the bare fallow. The stubble of the corn catches the snow and holds moisture for the following year, at the same time preventing the drifting of soil. Another practice followed in South Dakota is the sowing of oats or barley in strips on the summer fallowing land. Three rows of grain are sown together then a blank space of three feet to the next three rows. The common seeder is used, leaving the first three holes open, the next being closed for a space of three feet then three open and three feet closed and so on. The three feet of open blank between the strips are cultivated for corn. The grain is cut by the binder when matured or nearly so. The strips of stubble remain catching the snow in winter and holding moisture for the following spring. As these fields are sown in the spring without cultivation, the stubble and fibrous roots prevent the drifting of the soil.

The cultivation of Western rye and Bromegrasses, as well as alfalfa and sweet clover, was strongly advocated. The growing of grasses, legumes, and fodder corn implies the keeping of stock. A study of the situation indicated that farmers are trying to do something in South-western Saskatchewan that nature never intended they should do. Growing grain alone will have to give place to mixed farming, in which grasses and fodder crops with live stock will give a measure of success every year. A number of the farmers present testified as to their success with sheep and cattle. Sheep are recognized as being the best implement a farmer can have on his farm to destroy weeds. With the raising of fodder crops and live stock it was pointed out that silos were a necessity. The sun-flower experiments are giving good results and it is probable that sun-flower silage will be an important item in the winter rotations of live stock in these districts.

Very strong recommendations were brought forward for the increased use of rye, especially winter rye, in the rotation. It was pointed out that winter rye made use of the moisture in the late fall and early spring, which is lost as far as spring crops are concerned; also the times of seeding and of

harvesting are during periods when there is a minimum rush of farm work; further the seeding being done in early autumn, the roots are well established and good growth is attained before winter, which helps hold the snow in spring. The fibrous root systems are a valuable barricade against soil drifting. For these reasons the growing of fall rye was strongly recommended.

Among the resolutions presented at the conference was one suggesting to the farm congress and provincial government the need of finding ways and means of transferring persons desirous of moving from present unsuitable locations to land more suitable for general farming, where they might be able to retrieve their positions.

Another resolution expressed the appreciation of the conference for the work done by the Department of the Interior, through its Irrigation Branch, in studying the water supply in Saskatchewan with a view to its efficient utilization for artificial irrigation. It was further resolved that the Department of Interior be requested to prosecute these studies as rapidly as possible with a view to determining more accurately the area and location of irrigable land in the province and the probable cost of the construction of the different projects.

A resolution was passed suggesting that members of the congress, through the Department of Agriculture, should establish a co-operative relationship with the Departments of Agriculture in the corn states of the United States, whereby a sufficient supply of mature seed of suitable variety may be secured for fodder-growing requirements.

A resolution was passed asking the Saskatchewan Government to so amend the municipal law as to make it possible for a municipal council to control the burning of straw within the municipality. It was pointed out that had the straw from the 1915-16 crops been saved some serious reduction of herds and heavy financial loss could have been averted.

A resolution requesting the provincial government to take the necessary steps to

have the soils of the prairie classified in order to prevent the further settling of land unsuitable for tillage was passed.

Owing to the fact that the results of experiments conducted in one part of the province are not always applicable to conditions in other parts, the University of Saskatchewan was asked to establish sub-stations for the investigation of problems relating to crop conditions on every principal soil type, and in each climate zone in the province of Saskatchewan. The appreciation of the work of the Dominion Seed Purchasing Commission, and a request that this service be continued and extended by purchasing adequate seed supplies of fall rye for the seeding of 1921 acreage, was embodied in a resolution which emphasized the value of fall rye for seeding purposes and indicated the difficulty of securing satisfactory supplies of this seed.

A resolution asking the Dominion Government to appoint a commission to survey all lands now classified as grazing lands and such other land found fit for grazing purposes only, and on this survey to base a new classification; also that first claim to grazing privileges on such lands shall be given to the men now on the land in proximity to such rough areas.

In order that encouragement and assistance may be given the dairy industry in semi-arid areas, a resolution requesting that railway facilities be extended with a view to preventing the loss of perishable dairy products and to bring about maximum production was passed and copies forwarded to the Minister of Railways, the President of the Canadian Pacific Railway, and the President of the Canadian National Railway.

The last resolution recommended that the Dominion Meteorological Survey establish more meteorological stations in the Prairie Provinces with a view to securing more detailed information in local areas in order that farmers may better adopt their system of farming to the conditions that exist.

ASSOCIATIONS AND SOCIETIES

ONTARIO VETERINARY ASSOCIATION

The annual convention of the Ontario Veterinary Association was held in Toronto on August 11th and 12th. At this meeting consideration was given to many problems

relating to the live stock industry due to the occurrence of such diseases as tuberculosis, contagious abortion, and sterility in cattle.

THE ONTARIO POULTRY CONFEDERATION

At a conference of the Ontario Poultry Confederation held at the Ontario Agricultural College a constitution was adopted. This organization which was formed a year ago constitutes a federation of all the local

poultry associations in the province. It is recognized by the Ontario Department of Agriculture which provides funds for the expenses of delegates attending the annual convention. It is further related to the

department by the fact that the secretary-treasurer is the director of the Live Stock Branch of the Provincial Department of Agriculture. The objects of the association, which is incorporated under the Agricultural Associations Act, are to promote, protect, and develop the poultry industry in all its branches, to encourage a general and constant improvement in poultry, breeding, and a better organization of the interests of the breeders of poultry throughout the province:—

(a) By co-operating with the Department of Agriculture.

(b) By holding meetings to discuss and deal with matters of importance to the poultry industry of the province.

(c) By co-operating with exhibition and live-stock associations and societies to advance the interests of the live-stock industry generally with special reference to the interests of the poultry industry.

(d) By holding or assisting to hold competitive exhibitions and educational meetings.

(e) By engaging in extension work on behalf of the poultry industry and educating breeders and others to its importance and improvement.

The membership of the association is made up of local poultry associations and such other organizations as may be approved by the confederation. The constitution provides that annual meetings shall be held at the Ontario Agricultural College in the month of June each year.

THE MANITOBA POTATO GROWERS' ASSOCIATION

A potato growers' association has been organized in Manitoba. The following are the principal officers: President, R. P. Andrews, Bird's Hill; vice-president, W. J.

Harrison, R. R. No. 4, Winnipeg; Secretary-treasurer, F. W. Brodrick, Agricultural College, Winnipeg.

WESTERN CANADA IRRIGATION ASSOCIATION

BY JAMES COLLEY, SECRETARY

The Fourteenth Annual Convention of the Western Canada Irrigation Association was held at Lethbridge, Alberta, at the end of July. There was a large attendance, especially from the three most western provinces. There were also delegates present from Eastern Canada and the United States. The addresses were largely of an educational nature and dealt with silos, seed grain, soil drifting, road construction, and other subjects related to successful agricultural practices. Special attention was given to the growing of alfalfa on irrigated land. Mr. Don H. Bark, the alfalfa specialist of Alberta, claims that large crops of seed of superior quality were grown under irrigation. Seed thus produced last year, it was reported, won prizes at exhibitions in the North Western States and in Canada. Among the more

important resolutions passed was one calling for a change in the definition of "owner" in the Alberta Irrigation Act so as to facilitate the erection of irrigation districts. Another resolution requested the Dominion Government to proceed with the surveys to ascertain how much land can be irrigated by the waters of the Battle River; urging the Provincial and Dominion Governments to co-operate in arriving at some satisfactory method of financing irrigation districts. It was decided to hold the next convention at Vernon, B.C. The following officers were elected: President, Hon. T. D. Pattullo, Minister of Lands, British Columbia; vice-presidents, Hon. Hewitt Bostock, of British Columbia, and Mr. J. A. MacKelvey; secretary, James Colley, Calgary.

NOTES

A new piggery thirty-two feet wide and one hundred and thirty feet long has been erected at the Ontario Agricultural College.

The Grape Growers of the Niagara Peninsula, at a meeting held in Hamilton in August, decided to organize a co-operative Grape Growers Association. The principal purpose of the organization is to improve marketing conditions.

A feature of the summer school for teachers held in Victoria, British Columbia, was a visit to the Experimental Farm at Sidney. The farm was carefully inspected and the various experiments explained to the class.

Delegates of the Agricultural Societies of Saskatchewan to the number of 70 spent a day at the college of Agriculture about the middle of July. The visit was arranged for

by the Honourable the Minister of Agriculture who had prepared for the occasion a programme consisting principally of a visit of the experimental sections of the College farm. Heads of several of the branches addressed the delegation, explaining the work carried on under their direction.

To carry on the campaign for the protection of crops against the grasshopper in the province of Saskatchewan, a very effective organization was built up. This included a director-general in charge of the

entire campaign, a quartermaster in charge of the distributing of supplies, a chief field director who had charge in the field, sixteen field directors each with oversight of four municipal captains. The officers appointed by the rural municipalities were sixty-four municipal captains, 256 divisional lieutenants, and 768 sergeants. Very strong public support was given to the campaign. In some districts bankers, merchants, and other business men were joined by their wives and families in assisting the work.

NEW PUBLICATIONS

DOMINION

The progress of cow testing, by A. H. White, Esq., B.S.A., is bulletin number 58 of the Dairy and Cold Storage Series. This bulletin presents the details of organization, the objects of cow testing, and some of the results, together with tabulated information.

QUEBEC

The Annual Report of the Pomological and Forestry Society of the Province of Quebec for 1919, gives a list of the officers, a financial statement, and a report of the annual meeting held at Hemmingford on August 26.

Insects troublesome to Farm Stock, by Geo. Maheux, Provincial Entomologist, designated bulletin No. 67 of the Quebec Department of Agriculture, contains illustrations, descriptions, life history, and methods of combatting insects that affect horses, cattle, sheep, swine, poultry, dogs, and cats.

Report of the Dairymen's Association and of the Dairy School of the province of Quebec. This thirty-eighth annual report is a supplement of the report of the Minister of Agriculture for 1919. It includes the address given at the Dairymen's Convention held in February in Quebec City, together with much information of interest to dairymen in Eastern Canada.

MANITOBA

Potato Top Diseases, by V. W. Jackson and G. R. Bisby, Circular No. 52, third edition, Manitoba Department of Agriculture, contains a description of the diseases of potatoes that attack the tops which are evident in July and August. The diseases dealt with are mosaic, leaf roll, black leg, wilt, rhizoctonia, and curly dwarf, late blight, early blight, and tipburn. The circular tells how to combat these diseases.

How to preserve Eggs, by M. C. Herner, Circular No. 47, third edition of the Manitoba Agricultural College, Poultry Department, describes the methods of preserving eggs found satisfactory by experiment.

Standards for Judging Vegetables, Circular No. 56, Manitoba Department of Agriculture, contains the standards for judging vegetables adopted at the 1920 Annual Convention of the Manitoba Horticultural and Forestry Association. All garden vegetables grown in Manitoba are included in the circular.

ONTARIO

Motor Transportation in Rural Ontario, by Donald R. Cowan and F. C. Hart, Bulletin No. 277, of the Ontario Department of Agriculture, contains the results of a survey of motor trucking in rural Ontario.

MISCELLANEOUS

Potato Gardening, and Canning Competitions in Carleton and Russell Counties, Ontario. This report gives the objects and results of the boys' potato-growing contests in the Counties of Carleton and Russell, and of the girls' gardening and canning competitions in Carleton county in 1919. The pamphlet contains a brief account of the life of the late R. B. White through whose bequest the competitions were financed.

Hydro-Electric Power. The Hydro-Electric Power Commission of Ontario, have issued a pamphlet which describes the work of the commission in relation to the hydro-electric power obtained in the Niagara district. The pamphlet is generously illustrated showing representations of a large number of industries operated by the electric current, generated at the Niagara cataracts.

Note Book of Canadian Society of Technical Agriculturists. This publication contains information regarding the organization of the Canadian Society of Technical Agriculturists, and presents the objects of the association, together with the situation and relations, constitution and resolutions passed.

Canadian Shorthorn Annual 1919, is published by the Canadian Live Stock Records

for the Dominion Shorthorn Breeders' Association. Shorthorn pedigrees and families are given prominence and items of interest to Shorthorn breeders are contained in this publication.

NEW BRUNSWICK

Annual Report of the Department of Agriculture of the province of New Brunswick, for the year 1919. This publication contains reports of the Deputy Minister, and the chief officers of the various branches

of the Department of Agriculture for the year ending October 31, 1919.

NEWFOUNDLAND

Report of the Minister of Agriculture, of the Dominion of Newfoundland 1919. This report gives a concise summary of agricultural enterprises in Newfoundland during 1919. Part of the publication is devoted to potatoes and potato diseases. Reports of the activities of the agricultural societies are also given to show agricultural conditions

INDEX TO PERIODICAL LITERATURE

The Agricultural Journal, Victoria, B. C.
August.

Farm Management and Markets. W. Newton, M.Sc., Soil and Crop Instructor, page 164.

The Beekeeper, Peterborough, Ont.
August.

The Beekeepers' New Year. Prof. F. Eric Millen, B.S.A., Provincial Apiarist, Ontario Agricultural College, Guelph, Ont., page 224.

The Canadian Countryman, Toronto, Ont.
August 14.

Milk as a Food for Man and Beast. H. H. Dean, B.S.A., Professor of Dairy Husbandry, Ontario Agricultural College, Guelph, Ont., page 5.

Canadian Farm, Toronto, Ont.
August 18.

Shorthorns and Clydesdales at Highland Show. Hon. Duncan Marshall, Minister of Agriculture, Alberta, page 5.

The Canadian Horticulturist, Toronto, Ont.
August.

The European and American Plums. M. B. Davis, Assistant Dominion Horticulturist, Central Experimental Farm, Ottawa, Ont., page 219.

Grasshoppers and Their Control. Professor L. Caesar, Provincial Entomologist, Ontario Agricultural College, Guelph, Ont., page 220.

Growing Celery in Beds. T. G. Bunting, B.S.A., Professor of Horticulture, Macdonald College, Guelph, Ont., page 222.

Peach, Plum and Other Preserves. Percy E. Culverhouse, Vineland Station, Ont., page 223.

The Farmer's Advocate, London, Ont.
August 12.

The Hessian Fly. Professor L. Caesar, page 1412.

The Farmer's Advocate, Winnipeg, Man.
August 18.

The Digging of Potatoes. W. R. Macoun, Dominion Horticulturist, Central Experimental Farm, Ottawa, Ont., page 1377.

The Grain Growers' Guide, Winnipeg, Man.
August 18.

Harvesting and Curing Corn. F. B. Harrison, Instructor in Field Husbandry, University of Saskatchewan, Saskatoon, Sask., page 14.

The Journal of Agriculture and Horticulture, Quebec, Que.

August 1.

The Farm Management Survey. H. Barton, B.S.A., Professor of Animal Husbandry, Macdonald College, Que., page 27.

The Maritime Farmer, Sussex, N.B.
August 17.

Canning, Drying and Storing Fruits and Vegetables. W. T. Macoun, page 824.

Poultry, Pigeons and Petstock Journal of the West, Victoria, B.C.

August.

The Summer's Work Among the Poultry. Geo. Robertson, Assistant Poultry Husbandman, Central Experimental Farm, Ottawa, Ont., page 10.

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty, International Institute Commissioner, Department of Agriculture, West Block, Ottawa.

SCIENCE AND PRACTICE OF AGRICULTURE

CROPS AND CULTIVATION

Predicting Minimum Temperatures.—SMITH, J. W., in *United States Monthly Weather Review*, Vol. 47, No. 12, pp. 848-849. Washington, D.C., December, 1919.

This is a mathematical discussion of the relation between the relative humidity in the late afternoon and the variation of the minimum temperature during the coming night from the afternoon dewpoint temperature, when radiation conditions prevail.

The study shows that there is a well-defined relation which can be expressed by the curve for a parabola. The equation is written $v = x + by + cz$, in which v is the variation of the minimum temperature from the evening dewpoint; b is the evening relative humidity, and c is the square of the relative humidity; x , y , and z are the three unknowns, which are evaluated from three normal equations which are readily written by the star point method after the data have been properly charted. The results are remarkably accurate. The studies show that the minimum temperature can be closely predicted in the orchard at considerable distance from the observing station; that the hygrometric observations made at noon may be used quite as well in some instances as those made in the evening, and that the equation will sometimes apply as well to cloudy as to clear nights.

The Effect of Weather on the Yield of Potatoes.—SMITH, J. W., in *Potato Magazine*, Vol. I, Nos. 10, 11, 12. Mount Morris, Ill., 1919.

This article discusses the climatic conditions of the natural habitat of the potato and of the regions in which potato growing has been most successful, dates of planting and harvesting, water and temperature requirements, correlation of weather factors and yield, relation of region of growth to quality of seed potatoes, and relation of weather conditions to potato diseases. A short bibliography of the subject is also given.

As in previous articles on the subject, emphasis is placed upon the importance of cool, wet weather during the first ten days of July. Further investigation of this and similar subjects in agricultural meteorology is urged. The article suggests a number of important lines for such investigation.

Relation of the Moisture Equivalent of Soils to the Moisture Properties under Field Conditions of Irrigation.—HARDING, S. T., in *Soil Science*, Vol. 8, No. 4, pp. 303-312. Baltimore, Md., October, 1919.

Attention is called to the need for some criterion which will furnish an index of the soil moisture properties in studies of the water requirements of soils under irrigation. In this connection, a comparison of the moisture equivalent with the critical moisture points of soils under the actual field conditions of irrigation practice, is reported. This is based on data secured by the author in the course of various field investigations of the water requirements of soils and their irrigation practice, conducted under the supervision of the Irrigation Investigations of the Bureau of Public Roads, U. S. Department of Agriculture, and the University of California.

The general field method used was to take soil moisture samples before and after irrigation in order to determine the amount of water retained by the soils. The data were secured from a wide range of soils under varying conditions of practice, including about 9,200 individual moisture determinations from soils in Montana, Idaho, Washington, Nevada, and California, and about 300 moisture equivalent determinations made from 1913 to 1918, inclusive. Comparisons of four moisture conditions were made for the surface foot of soil and for the average of the upper 5 feet of soil, these corresponding to the maximum field capacities, the normal field capacity, the usual moisture before irrigation, and the wilting of the crop.

The data presented are thought to warrant the general conclusion that there is a fairly consistent relationship between the moisture

equivalent and the various moisture properties of soils, which appears to offer promise of usefulness in determining moisture properties and probable irrigation practice of soils whose irrigation is contemplated, particularly as to the probable depth of water which will be retained from an irrigation with its effect on the depth to be applied and the necessary frequency of application. The data presented, while indicating the general nature of the relationship of soil moisture capacity and soil texture, are not sufficient to fix the numerical values of such relationships except in a very general way. The relationship of the soil-moisture properties to the moisture equivalent does not appear to be linear except in the case of the wilting of the crop. The maximum depth of water per foot depth of soil which can be retained under favourable conditions for the upper 5 feet of soil is about 1.25 inches, which indicates that depths of a single irrigation in excess of 6 to 8 inches even under favourable soil conditions, will not be retained in the upper 5 or 6 feet of soil. This conclusion is in accord with the results of general field observations from many sources.

Management of Sandy Soils.—*Wisconsin Agricultural Experiment Station, Bulletin 302*, pp. 41-43. Madison, Wis., 1919.

Rotation experiments on the improvement of sandy soils conducted at the Hancock substation, in which a 3-year rotation of rye seeded to Mammoth clover, hay the second year, followed by corn, was used in one case; and a 4-year rotation used in the second case, which was the same as the first except that soy beans were planted the fourth year, showed that there was an operating loss of nearly \$1,000 in three years. An inventory of the soils assets, however, was taken to indicate that this loss is fully covered by the increased value of the fertility of the land. The results also indicate that commercial fertilizers in connection with green manuring crops will produce a material increase in the yields of nearly all crops. The addition of lime likewise proved very beneficial in building up these acid soils.

A Method for Estimating the Number of Protozoa in the Soil.—CUTLER, D. W., in *The Journal of Agricultural Science*, Vol. 10, Part 2, pp. 135-143. London, April, 1920.

A method is described by which it is possible to estimate the numbers of active protozoa in a soil.

The total number of protozoa is first found by a dilution method. A fresh portion of the soil is then treated with 2 per cent HCl, (sp. gr. 1.15) overnight. By this means all active forms are killed. A second count by the dilution method gives the number of cystic protozoa in the soil. From these results the number of active forms can be ascertained.

Symbiotic Nitrogen Fixation as Influenced by the Nitrogen in the Soil.—ALBRECHT, W. A., in *Soil Science*, Vol. 9, No. 5, pp. 275-319. Baltimore, Md., May, 1920.

The experiment reported in this article was a study of nitrogen fixation as influenced by the nitrogen content of the soil. Variations in the nitrogen of the soil were brought about by adding sodium nitrate, and by incorporating organic matter in the form of clover tops in a soil containing only 625 pounds of nitrogen per 2,000,000 pounds of soil. This gave variations in mineral nitrogen and organic nitrogen, respectively.

One crop of soy beans and two crops of cowpeas were grown. Some of the original soil was used each time for the treatment with nitrates, but the same soils were used throughout the three crops for the treatment with organic matter.

Nitrogen fixation is represented as the increase in the total nitrogen in the soil and crop at the close of the experiment, over that present in the soil and seed at the beginning.

The decaying organic matter occasioned some heavy losses in nitrogen from the soil. These losses reached the maximum during the second crop, and had apparently disappeared after 200 days. During the second crop, the highest losses of nitrogen from the soil were equivalent to 1,538 pounds per 2,000,000 pounds of soil where the original application of clover tops was equivalent to 4,660 pounds of nitrogen per acre. These losses from the soil with the heavy applications of organic matter made it impossible in a few instances to measure the nitrogen fixation. In those soils, however, to which were added nitrates and smaller quantities of organic matter, nitrogen fixation was easily measured and a decided amount was found.

The addition of the approximate equivalent of 1,000 and 2,000 pounds of nitrogen as organic matter per acre, corresponding to 18 and 36 tons of clover tops, respectively, gave nitrogen fixation for all three crops grown. For the last crop grown, during which time the soils no longer showed losses of nitrogen, there were decided gains, or nitrogen fixation, for all treatments with organic matter.

Nitrates did not prohibit nitrogen fixation. Indications in one series of cowpeas suggested that increasing amounts of nitrogen applied as sodium nitrate lessened the amount of fixation. A later series of the same crop with higher and wider ranges of the application of nitrates failed to show the same results, even when as much as 250 pounds of nitrogen was applied in this form. This corresponded to an application of more than 1,500 pounds of sodium nitrate per acre.

The addition of sodium nitrate to the soil caused the plants to grow better at the beginning, but gave no increased nitrogen fixation for two series of cowpeas, save in one

treatment of 150 pounds of nitrogen per acre, where the fixation was slightly greater than that of the check. Fixation in all other treatments with nitrates was less than that of the check.

After the soils treated with organic matter ceased to lose nitrogen by decomposition, they showed a large nitrogen fixation. The organic matter added caused this fixation to be larger than that in the soils not so treated. The increase in the nitrogen fixed as caused by the organic matter, was not proportional, however, to the amount of organic matter applied.

There were some variations in the amounts of nitrogen taken from the air by five plants of cowpeas in each pot. The maximum average fixation for duplicate pots was 1,295 mgm on a soil containing the equivalent of 2,000 pounds of total nitrogen per acre. Amounts almost as large were obtained in soils treated with 150 pounds of nitrate nitrogen per acre.

Nodule production was not suppressed to an appreciable extent by any of the treatments of nitrate or organic matter.

The untreated soils which grew legumes for three successive crops showed gains in their nitrogen content as a result of these crop growths, even though all roots were removed from the soil as completely as possible. In the last crop of cowpeas grown, all soils from which the roots had been removed, became richer in nitrogen under this treatment, even though some of these soils contained more than 3,000 pounds of nitrogen per acre before the crop was grown and the crop itself contained more than one-fourth of this amount. This fact indicates that the growth of a legume may be large, but yet leave the nitrogen content of the soil nearly constant or even increase it, and that the addition of the plant roots will increase the soil's nitrogen content when there is no loss by leaching.

As the soil's content of total nitrogen or of nitrate nitrogen was higher, the yield of plant tissue became greater; and the greater part of this increase was in the tops of the plant rather than in the roots. With a higher nitrogen content of the soil, a bigger share of the plant's total nitrogen was also in the tops.

Conclusions.—1. The results of this study indicate that nitrogen fixation will take place in a soil containing large amounts of nitrogen in the form of either nitrates or organic matter.

2. No injurious effects on nitrogen fixation were caused by nitrate in this experiment, and if such ever occur under conditions similar to those which obtained in this study, the application of nitrates must be many times larger than is ever applied in agricultural practice.

3. Nodules are produced when large amounts of organic nitrogen are present in the soil, and good legume growth results

even when sufficient organic matter is present to give large losses of volatile nitrogen from the soils.

4. The addition of some organic matter may increase the amount of nitrogen fixed by cowpeas.

5. In soils containing varying amounts of total nitrogen, as much fixation of nitrogen by cowpeas may be expected in one with 3,000 pounds of total nitrogen, as in one with lesser amounts. According to the data given variations in the amount of total nitrogen in a soil failed to exert any varying influence on the amount of nitrogen fixed.

Field Experiments on the Availability of Nitrogenous Fertilizers, 1908-1917.—

LIPMAN, J. G., and BLAIR, A. W. in *Soil Science*, Vol. 9. No. 5, pp. 371-392. Baltimore, Md., May 1920.

This is a report for the second 5-year period of work that was started in 1908, the object of which is a study of the relative availability of different nitrogenous materials, and of nitrogen losses under a 5-year rotation of corn, oats, wheat and two years of timothy.

In laying out the experiment forty $\frac{1}{20}$ -acre plots were provided in parallel sections of twenty plots each, so that the nitrogen work could be duplicated, the one section designated as "A" remaining unlimed and the other designated as "B" to be limed at stated intervals.

Both sections have been supplied with liberal amounts of phosphorus and potassium so that these might not become limiting factors.

With slight exceptions the mineral nitrogenous materials have increased the yields over the yields from the check plots. The average yields of dry matter, and the percentage of nitrogen recovered have been greater with the mineral nitrogenous materials than with organic materials. Of the four mineral materials, nitrate of soda gave the largest yields of dry matter, and the highest percentage of nitrogen recovered on the unlimed section, and sulphate of ammonia the highest on the limed section. Of the three commercial organic materials, dried fish gave the highest yields of dry matter and the highest percentage of nitrogen recovered on the unlimed section, and dried blood the highest on the limed section.

Farm manure, and farm manure with nitrate of soda gave the largest total yields, but on account of the large excess of nitrogen supplied by these materials the increases can hardly be considered profitable when compared with the increase made by the commercial nitrogenous materials.

The four mineral nitrogenous materials gave for the period 1913-1917 an average recovery of 29.4 per cent of nitrogen for the unlimed section and 33.3 per cent for the limed section. The corresponding figures for the three organic materials are 23.5 per cent

and 27.1 per cent. There is thus shown an average loss of more than two-thirds of the applied nitrogen.

With the exception of the corn crop of 1913 the yields on the limed section were about the same as on the unlimed section. There is practically no difference in percentage of nitrogen in the dry matter from the limed and the unlimed sections. Analyses of samples of soil from plots of the two sections show that the limed plots have lost, during the 10 years, nearly 250 pounds more of nitrogen than the unlimed plots. The loss of carbon also has been greater on the limed than on the unlimed section.

It is suggested that in the case of soils of this type and with no legume crops in the rotation to furnish additional organic matter, oxidation may go on rapidly enough without the stimulating effect of lime.

The supply of nitrogen and carbon has been best maintained on those plots which have received the farm manure and the farm manure plus nitrate of soda. The carbon content of these plots has even been increased over the carbon content of the original soil.

The work emphasizes the difficulty of maintaining the nitrogen supply of the soil at a high level under continuous cropping to *non-leguminous* crops, even when *commercial fertilizers* are supplied in generous amounts.

The Residual Effect of Superphosphate.—

GORDON, G. S., in *Journal of the Department of Agriculture of Victoria*, Vol. 16, No. 10, pp. 616-617. Melbourne, 1918.

Observations on the residual effect of Thomas phosphate and superphosphate over a period of five years in a shallow, light red to gray loam soil, overlying clay, and growing wheat, are reported. The Thomas phosphate was added at rates of 50 and 100 lbs. per acre and the superphosphate at rates of 50, 100, 150 and 200 lbs. per acre.

It was found that the results from Thomas phosphate were not nearly so marked as those from superphosphate, and it is noted that the phosphoric acid contained in the latter had apparently neither leached out during a wet season nor reverted to unavailable forms.

Bacteriological Effects of Green Manure.—

BRISCOE, C. F., and HARNED, H. H., in *Mississippi Agricultural Experiment Station*, Bulletin 185, pp. 3-18. Agricultural College, Miss., 1918.

This is a progress report on experiments begun in 1913 to determine the effect of micro-organisms in the fermenting of green manures and particularly the advantage of a light dressing of stable manure as compared with that of a bacterial culture in the utilization of these green manures for plant food. The work included bacteriological and vegetative tests. The soil used was a mixture of sandy silt and sandy loam soil and was deficient in plant nutrients. The

green manures added were alfalfa, oats, and cowpeas.

It was found that there was a direct relation between the bacterial count and the amount of organic matter added. The results of the vegetative tests and the bacteriological tests agreed closely. A light dressing of stable manure or the addition of a bacterial culture with a green manure gave a marked increase in the crop when 4 tons of the green manure were added. When 8 tons were added the effect was practically neutral, and when 16 tons were added a depressing effect was noted from the addition of the organisms contained either in the manure or in the bacterial culture. This phase of the work is to receive further attention.

The nitrogen content of the oat crop varied with the amount of crop produced, but not in direct proportion. The accumulative effect of green manure was marked, showing a uniform increase through the various treatments and continued effect in the following years. When dry oats and vetch straw were turned under it was found that amounts as large as 16 tons were readily utilized and produced a crop 3.2 times that from the untreated soil. Eight tons of the straw produced a larger crop than 20 tons of horse manure. The proportions were about one part oats and two parts vetch straw, and the horse manure was applied with and without lime. It was also noted that where large amounts of the oats straw were used together with horse manure or with a bacterial culture, or both, a depressing effect was brought about.

Effect of Premature Freezing on the Composition of Wheat.—

BLISH, M. J., in *Journal of Agricultural Research*, Vol. 19, No. 4, pp. 181-188. Washington, D.C.

A consideration of the effects of freezing temperatures upon the chemical composition of the immature wheat kernel is of general interest from a biochemical standpoint and of special interest to those engaged in the study and handling of wheat and its milling products, particularly in the spring-wheat sections. It is of economic importance, especially during the present high prices of wheat and its products, that a large amount of what is popularly called "frosted wheat" is annually classed as fit for nothing better than chicken feed.

This paper presents results of an investigation of the effect of premature freezing on the more important chemical constituents of the wheat kernel, paying special attention to the nitrogen compounds, from which the gluten is formed. The results of the experiments show:

(1) Premature freezing affects the chemical composition of wheat and the flour milled therefrom.

(2) Frozen wheat contains larger amounts of nonprotein nitrogen, reducing sugars,

and acid-reacting constituents than does sound wheat.

(3) The nonprotein nitrogen of frozen wheat carries a considerably higher percentage of a-amino nitrogen than that of sound wheat.

The Relation of Protein Content to Variety Types in American Wheat.—ROBERTS, H. F., in *The Journal of Agricultural Science* Vol. 10, Part 2, pp. 121-134. London, April, 1920.

Protein in wheat is the most important constituent, and therefore the chief constituent to breed for. No wheat variety possesses at once combined the desired characteristics of high protein, high yield, maximum flour production, and maximum bushel weight.

So far as climatic factors are concerned, a short, comparatively dry growing season, especially in the spring, in the case of winter wheat, favours the development of grain rich in gluten, and hence high in protein.

The most important ground factor in determining the starch-protein ratio is the water supply. The protein content has been found to vary from 11.63 per cent under 22-24 inches of rainfall to 14.93 per cent under 12-13 inches (Minnesota); and from 12.63 per cent under 25 inches of irrigation to 13.62 per cent under no irrigation (Utah).

With regard to regional types of wheat, the range of variation in protein content is from as low as 9.16 per cent (soft winter from Montana) to 13.89 per cent (hard winter from Utah). With respect to regions of the country, variation in protein percentage ranges from 11.35 per cent in the Atlantic and Gulf States to 12.74 per cent in the Western States, while the wheats of the Pacific Coast run as low as 9.73 per cent. Maine experiments show an even wider range, where the same wheats were grown in Maine and Minnesota, running from 12.20 per cent of protein for Maine to 14.52 per cent for the western-grown wheat.

Besides differences in the protein content of wheat owing to locality, there are differences due to variety itself. Speaking generally, the bread wheats are the lowest 13.44 per cent—13.68 per cent; the Russian durumms next (14.20 per cent—15.19 per cent), and the Mediterranean durumms highest (14.51 per cent—16.14 per cent). Within the bread wheats, there are varietal differences ranging from as low as 9.76 per cent in Red Russian to 12.44 per cent in Bluestem (Washington); and from 15.11 per cent in Gold Coin to 17.45 per cent in Wellman's Fife (Utah). Flour analyses from Maine, Minnesota and Utah show Fife to exceed Bluestem by an average of 1.35 per cent. In Washington, in any locality, Bluestem has been found to carry one-sixth more protein than Little Club. In Utah, Gold Coin was constantly the lowest in protein of any variety.

The variation in protein content is measured by the error of mean square, or "standard deviation." It appears that, computing the data from California and Utah the wheat varieties most widely grown in those states are the ones that turn out, according to the writer's computation, to have the widest variability in respect to their protein content, *i.e.*, which have the highest standard deviation. This is true of Club wheat in California, and, in the order named, of Bluestem, Little Club, Turkey Red, Jones' Winter Fife, and Forty-fold in Washington.

The conclusion is, since variability in protein content is a varietal characteristic in wheat, that, in breeding for general purposes, wheat strains should be sought out which vary greatly in this respect, rather than those which are rigid. In other words, greater flexibility in the starch-protein ratio means greater climatic adaptability. In breeding for a limited locality, wheat with a maximum protein content, and with the least possible variability with respect thereto, is to be sought; the variability in this respect being computed in terms of the error of mean square or standard deviation.

AGRICULTURAL INDUSTRIES

Protection of Potatoes from Cold in Transit.—U. S. Department of Agriculture, *Farmer's Bulletin*, 1091, pp. 27. Washington, D.C., 1920.

This bulletin is a revision of Bureau of Markets Document 17, and explains successful methods of lining and loading potatoes in box cars, produce cars, refrigerator cars and heater cars, based upon commercial practices and the results of tests and inspections. The specific lining and loading directions are designed primarily for cars with a heater in the doorway, unless otherwise specified.

It is stated that of 400 cars of northern potatoes examined during the winter of 1917-18, approximately one-fourth were lined and loaded correctly, while in the remaining three-fourths there was always the danger of overheating the potatoes at the top of the load and at the same time allowing the potatoes on the floor to freeze. It is also stated that it is comparatively simple for a heater to furnish enough warm air to protect a car of potatoes from freezing, even in severe weather. To accomplish this a complete air passage the full width of the car must be kept open around the load. In this connection attention is drawn to the following points; (1) The potatoes must not be loaded close enough to the ceiling to block any part of this circulation; (2) there must be a large, unobstructed opening for the warm air to pass down to the floor after it has spread the length of the ceiling from the heater; and (3) the false floor must

be so constructed that this warm air can pass under it at all points back to the heater again. This circulation is slow and laboured and is limited by the small opening in the space provided around the load, just as the effectiveness of a chimney is limited by the narrowest place in the flue. If the space around the load is partially blocked by the potatoes themselves, or by boards, shavings, or straw, the warm air will not circulate as it should.

The Causes of Deterioration and Spoiling of Corn and Corn Meal.—MCHARGUE, J. S., in *Journal of Industrial and Engineering Chemistry*, Vol. 12, No. 3, pp. 257-262. Easton, Pa., 1920.

This contribution from the Kentucky Experiment Station reports the results of an extensive investigation of the underlying causes of the deterioration and spoiling of corn and corn meal during storage or while in transportation.

The fundamental cause of deterioration was found to be excessive moisture. The laboratory experiments reported indicate that sound corn containing 12 per cent of moisture can be kept in good condition in storage for at least 12 months, provided it is not exposed to conditions in which moisture can be absorbed. Corn containing 15 per cent of moisture will mold if confined in airtight vessels at ordinary temperature, and if the moisture content reaches 20 per cent, alcoholic and acid fermentations will result.

Similar experiments with meal ground from whole grains of sound corn containing 12 per cent of moisture indicate that, while more susceptible to hydrolytic changes resulting in an increase in acidity, such meal can be kept for a period of 12 months when air and moisture are excluded without acquiring any musty or sour odor. How seriously this increase in the acidity of the oil affects the palatableness and wholesomeness of bread made from such meal remains to be determined in future experiments. Except from the standpoint of acidity, the meal is apparently in a perfectly sound condition and has even retained a nutty odour. By still further lowering the moisture content of the meal the development of acidity may be reduced to a negligible quantity. By storing at a lower temperature the development of acidity may also be retarded.

The different species of molds which developed in some of the samples of corn and corn meal under unfavourable conditions were isolated, grown in pure cultures, and identified. These include *Penicillium expansum*, which was observed only in the germ of the corn and which made the most prolific growth of any of the species; *Aspergillus glaucus* and *A. albus* which developed in isolated clusters on the germ; and *Citro-*

myces sp., which grew vigorously on the degerminated part of the corn.

In applying the results of this investigation to problems of commercial handling of corn the author states that apparently the reabsorption of moisture is a very important cause of the spoiling of large quantities of export corn while in transit to European ports. If corn containing no more than 12 per cent of moisture were stored in perfectly dry holds and so protected that moisture could not enter, there appears to be no reason why such corn should not keep in a sound condition during transportation on the ocean. Similar protection of corn meal is thought to be sufficient to insure its preservation for comparatively long periods of time, and to obviate the necessity of degerminating the corn previous to grinding, a practice which is considered by the author not only to be unnecessary but to be harmful from the standpoint of nutrition.

Report on the Effect of Air-Tight Storage Upon Grain Insects.—DENDY, A., and ELKINGTON, H. D., in *Report of the Grain Pests (War) Committee of the Royal Society* No. 6, pp. 51, London, January, 1920.

The chemical and physiological problems connected with the destruction of insect life in hermetically sealed vessels is discussed, the efficacy of this method having already been demonstrated. (*Agricultural Gazette*, April, 1920, p. 362.)

The results of experiments to determine as accurately as possible what are the factors concerned in the death of insects in sealed vessels, are summarized as follows:—Grain insects sealed in air-tight vessels, with or without wheat, succumb as soon as the oxygen has been used up, a corresponding amount of carbon dioxide being produced. The only gases present in such sealed vessels, under normal conditions, are oxygen, nitrogen and carbon dioxide. The amount of carbon dioxide given off by live wheat in air-tight vessels varies directly with the moisture content and the temperature. As regards moisture content there is a critical point, above which the production of carbon dioxide by wheat suddenly increases very greatly. This critical point varies slightly with the temperature. For the temperature and wheats investigated it lies between 13.25 and 16.95 per cent. Above the critical point of moisture content wheat stored in air-tight receptacles very soon renders itself immune to the attacks of grain insects, but below this point it takes a comparatively long time to do so. Data are given in the appropriate places. The amount of oxygen absorbed by live wheat of low moisture content is greater than the amount of carbon dioxide given off. At about 30°C., 100 *Calandra oryzae* give off 29.5 mg. (nearly a fifth of their own weight) of carbon dioxide in 24 hours, and at 20-21°C. only about 9.38 mg. Weight

for weight, *C. granaria* gives off rather less carbon dioxide than *C. oryzae*, which is to be accounted for by its less active habits. The respiratory quotient for *C. oryzae* is about 0.773 and for *C. granaria* about 0.815, indicating that the respiratory processes of these insects are perfectly normal.

The complete absence of oxygen is alone sufficient to kill weevils, without taking into account the presence of carbon dioxide, though they are able to remain alive for a considerable time when only small percentages of oxygen are present. The extent to which weevils are able to make use of oxygen in sealed vessels depends upon the percentage of that gas initially present. Carbon dioxide exerts a poisonous effect upon weevils apart altogether from the question of diminished oxygen pressure. Thus at 30-31°C. *Calandra oryzae* was killed in less than 12 days in an atmosphere containing from 14.08 to 22.56 per cent of CO₂, though 13.88 per cent of O₂ still remained. Pure (moist) carbon dioxide is less fatal in its effects than carbon dioxide with a small admixture of oxygen. Pure (moist) carbon dioxide acts almost instantaneously as a narcotic, under the influence of which weevils may remain motionless for a long time without losing their power of recovery.

It has not yet been found possible to devise a method by which the time may be accurately estimated that is required to render wheat in an air-tight silo of given dimensions and under given conditions immune from the attacks of insects by the normal consumption of oxygen and production of CO₂. The rate of oxygen consumption and CO₂ production varies greatly with conditions of temperature and moisture, and it is difficult to determine even approximately the number of insects that may be present in the wheat. While no definite statement can be made, it is considered that infested grain put into air-tight storage cannot be seriously damaged by insects; for if only a few were present, they could not do much damage in the time before they died, and if many were present, they would all be killed in a very short time by oxygen consumption and CO₂ production.

A series of experiments to determine the effect of sealing 100 grains of weevil-infested wheat in varying amounts of air-space demonstrates clearly the efficiency of hermetic sealing even when a relatively large air-space is present. The tests also indicated that sealing wheat for a short time would be a useful means of testing concealed weevil-infestation. The general advantages of air-tight storage are briefly summarized, and in conclusion, the importance of this method is urged as a means of maintaining a reserve of cereals in case of war or failure of crops.

Report on the Vitality and Rate of Multiplication of Certain Grain Insects under Various Conditions of Temperature and Moisture (1).—DENDY, A., and ELKINGTON, H. D., in *Report of the Grain Pests (War) Committee of the Royal Society*, No. 7, pp. 52. London, January, 1920.

The following summary is given of the results of experiments on the vitality of the most important weevils attacking stored grain:—Under suitable conditions of temperature and moisture and with an abundant supply of wheat, *Calandra oryzae* and *C. granaria* show a very high rate of increase and breed all the year round. The optimum temperature for the breeding of *Calandra oryzae* and *C. granaria* is about 82°F., for *Rhizopertha dominica* somewhat higher. At all temperatures and under all conditions when breeding takes place at all, *Calandra oryzae* increases much more rapidly than *C. granaria*, the maximum observed for the former species being a 700-fold increase in 16 weeks, at an average temperature of 82.5°F. For this reason *C. oryzae* is a more serious danger than *C. granaria*, unless indeed in the British Isles the higher rate of increase is counterbalanced by the higher death-rate of the adults in winter. At ordinary room temperature in the British Isles both *Calandra oryzae* and *C. granaria* multiply only during the warmer months of the year, the lower temperature limit for multiplication being probably about 65°F., while for *Rhizopertha* it is probably about 70°F. At ordinary room temperatures nearly all adults of *Calandra oryzae* are killed off during the winter, but large numbers of larvæ survive in the interior of the grains.

The adults of *Calandra granaria* on the other hand, survive the winter in large numbers, the death-rate being little, if any, higher than at other times of the year. The adults of the three species show remarkable differences in their susceptibility to cold. After being kept at a temperature of 33-36°F. for 11 days, 91 out of 100 *C. granaria* recovered, only 3 out of 100 *C. oryzae* showed very feeble signs of life, and none out of 100 *Rhizopertha dominica* recovered. *Rhizopertha dominica* is less susceptible to high temperatures than the two weevils, the lethal temperature for an exposure of three minutes being about 146°F. for the former and between 120° and 131 °F. for the latter (in the adult condition). An exposure to a temperature of 145.5° F. for five minutes is sufficient to kill the larvæ of *Calandra oryzae* and probably to sterilize the wheat completely as regards all insect life. Although a moist atmosphere is undoubtedly more favourable than a dry one for the two weevils, both species can live and multiply in a dry incubator, *Calandra oryzae* increasing much more rapidly than *C. granaria*, provided the initial moisture content of the grain is

(1) See also Agricultural Gazette, April, 1920, page 362.

sufficiently high. Very dry wheat is less liable to attack by weevils than wheat with a moderate or high moisture content, but wheat readily absorbs moisture in a damp atmosphere, and thereby becomes much more susceptible to weevilling. *Rhizopertha* can withstand dry conditions better than either of the two weevils. *Calandra oryzae* and *C. granaria* are both likely to be serious pests in the British Isles, but little is to be feared from *Rhizopertha dominica* under ordinary temperature conditions. In addition to the damage done by actual consumption of the grain the presence of weevils results in extensive fouling with foetal matter, encouraging the absorption of moisture and the ultimate rotting of the whole mass. In large quantities of wheat the process of decay is doubtless accelerated by rise of temperature due partly to the presence of insects and partly to "heating of the wheat."

Grain Dust Explosion Prevention.—*United States Grain Corporation, Publication*, pp. 28. New York, June, 1920.

How the Grain Corporation handled the entire wheat supply of the United States during the past year, with only one disastrous explosion in a grain elevator where its stocks were stored and an actual loss limited to \$25,000, is told in a booklet issued on the grain dust explosion prevention campaign which has just been concluded under the direction of the Grain Corporation by experts of the Bureau of Chemistry, Department of Agriculture.

The campaign was instituted in July, 1919, at the suggestion of Julius H. Barnes, Wheat Director, and \$50,000 was appropriated for the work by the Grain Corporation.

In the booklet is described fully the educational work of the campaign, which was carried on by means of pledge cards, meetings in various grain centres and through co-operation with the Canadian Government; improvements brought about in the condition of plants; the literature and posters distributed in the interest of the work; results of the campaign; disastrous explosions which occurred during the past year due to grain dust accumulation; and experimental work and tests made in the interests of the milling and grain men.

As a result of a campaign of education in grain dust explosion prevention the Grain Corporation suffered no extensive losses from fires or explosion during its existence of almost three years. The importance of this record is emphasized by the fact that the Corporation had at all times in storage grain and flour stocks worth \$100,000,000 and at certain times approximately \$500,000,000.

The success of this fire-prevention crusade is emphasized by comparison with the losses suffered by other industries during the special campaign period. Explosions and fire damages in the grain trade appear to have

decreased since the Bureau of Chemistry workers started their lectures and the distribution of literature.

A disastrous explosion in a starch factory of the Middle West in May, 1919, caused the loss of 43 lives and property damage amounting to \$3,000,000. In August, 1919, one of the Canadian Government's grain elevators was badly damaged by a dust explosion in which ten persons lost their lives and ten were injured. Aluminum dust exploded in a Wisconsin factory, causing the deaths of six girls and many injuries. Minor explosions are recorded for the year in feed mills, flour mills, and other industrial plants.

Co-operation on the part of the workmen in fire-prevention is invaluable, according to the Corporation booklet. The proof of this is in the fact that during the nineteen months between October, 1917 and May, 1919 no dust explosions occurred in any plants where employees had pledged support to the campaign. This record is in marked contrast to the five disastrous explosions in the United States and Canada which took place in the preceding twenty months or between March, 1916 and October, 1917.

Phosphorus in Butter.—CUSICK, J. T., in *Cornell University Agricultural Experiment Station, Mem.* 30, pp. 159-187. Ithaca, N.Y., April, 1920.

For the experiments described in this article, butter was made from cream treated in the following ways: sweet cream ripened with starter; sweet cream churned without starter; lactic acid added to cream and the mixture pasteurized; raw cream self-ripened; lactic acid added to cream and churning begun at once; sweet cream pasteurized and then churned immediately; pasteurized sweet cream ripened with starter. All the methods of handling had some influence on the phosphorous compounds in the cream and subsequently on the phosphorous compounds in the stored butter. Pasteurization had the most decided influence. When cream containing acid was pasteurized, an appreciable amount of phosphorus was rendered soluble and lost in the butter-milk and the wash waters. Much of this phosphorus evidently came from the insoluble protein residue. Pasteurized sweet cream suffered but little phosphorous loss except in the protein residue. More phosphorus was lost when pasteurized sweet cream was subsequently ripened with starter. In the unpasteurized samples, sweet-raw-cream butter retained the largest amount of phosphorus, butter made from raw cream ripened without starter was next, while butter made with starter ranked third.

After fifteen months the samples were again analysed, and the analyses showed that the phosphorus in the organic compounds had broken down to the inorganic form. Exceptions to this were in the butter

made from raw cream ripened with starter, and in the butter made from pasteurized sweet cream subsequently ripened with starter. With the exception of these two, all the samples increased in the phosphorus content of the protein residue. All samples, without exception, increased in soluble inorganic phosphorus during storage. The organic phosphorus compounds in the unsalted samples were slower to break down than were the organic phosphorus compounds in the corresponding salted samples.

There seems to be plenty of evidence that an alcohol-soluble protein containing phosphorus exists in butter and is closely related to casein.

From the results obtained with the samples of butter containing varying amounts of sodium chloride, it can be inferred that salt has an accelerating action on the solubility of insoluble organic phosphorus compounds.

About two-thirds of the total phosphorus of the cream is retained in the buttermilk, and the remaining one-third is shared by the wash waters, the salt exudates, and the butter. The butter finally retains about one-quarter of the phosphorus originally present in the cream.

After fifteen months in storage, all the phosphorus compounds in the fat could be extracted by shaking in a separatory funnel with half-saturated sodium chloride solution. A 0.2-per-cent solution of hydrochloric acid was found necessary to extract the soluble phosphorus in the protein residue.

The substance that produces fishy flavour in butter, is undoubtedly preformed in the cream by the breaking-down of the lecithin. It may be assumed that through the solvent action of salt water and lactic acid, trimethylamine (the constituent giving fishy flavour) is formed from one of these broken-down fractions.

Conclusions.—In churning, about one-fourth of the total phosphorus of the cream is retained in the butter made therefrom. The remaining three-fourths is lost in the buttermilk, wash waters, and exudates during the salting process.

The methods of treatment of milk and cream before churning have an influence on the amount and the form of phosphorus retained in the butter. In storage the soluble organic phosphorus compounds break down, giving inorganic phosphorus compounds. The methods of treatment of milk and cream before churning determine how soon after storage organic phosphorus compounds will assume the inorganic form.

Salt in butter has a marked effect in bringing about protein decomposition during storage, even at a temperature of -10°C . The new protein of milk which is soluble in alcohol exists also in butter. Under certain conditions, bacteria are the controlling factors in bringing about chemical changes in the phosphorus compounds of butter.

The breaking-down of lecithin and the forming of trimethylamine is the cause of fishy flavour in butter. When fishy flavour develops in butter there is always an appreciable loss of soluble organic phosphorus.

PLANT DISEASES

Rust in Seed Wheat and Its Relation to Seedling Infection.—HUNGERFORD, C.W., in *Journal of Agricultural Research*, Vol. 19, No. 6, pp. 257-277. Washington, D.C.

The purpose of the investigations reported here was to determine whether or not *Puccinia graminis tritici* Erikss. and Henn. can be transmitted to the seedling by being carried over with the seed grain. The following is a summary of the experiments and their results:

Uredinia and telia of *Puccinia graminis tritici* Erikss. and Henn. have been found embedded in the pericarp on the hilar end of kernels of wheat and sometimes along the ventral groove as far up as the middle of the kernel. Infected kernels have black hilar ends, and groups of telia appear as shining black specks under either the hand lens or the binocular microscope.

Only a small percentage of infection was found by examination of the hundreds of samples of wheat from the crops of 1915 and 1916. A little over 1 per cent was the largest quantity found in any sample. The durum wheats were found most commonly infected.

Infection undoubtedly spreads to the kernel from original infection on the rachis, rachilla, or glumes.

The germinating power of the seed apparently is not impaired by this rust infection.

When rusted kernels of wheat were sown in the field, no earlier or more severe rust infection occurred on the resulting plants than on those grown in adjacent plots which were sown either with clean seed or with rust-infected seed which had been treated with the modified hot-water treatment.

More than 2,500 plants were grown from rusted seed in a specially constructed room in the pathological greenhouse at the University of Wisconsin, and no rust infection appeared upon any of them at any time. The conditions of growth of these plants were normal, and they produced plump grain.

No spread of infection from the pericarp to the young plant was found by examination histologically, although infected seed were germinated under various conditions, simulating as nearly as possible natural conditions in the field.

No infection appeared upon plants grown from seed which had been covered with viable urediniospores of stem rust before sowing.

The results of the experimental work here reported indicate that stem rust is not transmitted from one wheat crop to the next by means of infected seed grain. Further, in the writer's judgment, the occurrence of stem rust sori in the pericarp of the caryopses of grains and grasses has no special significance, but the infection spreads to these tissues just as it does from an infection point in any of the vegetative parts of the plant.

Studies of Stem Rust in Wisconsin.—

DICKSON, J. G., and JOHNSON, A. G., in *Wisconsin Department of Agriculture, Bulletin 20*, pp. 56-60. Madison, Wis., 1918.

During the spring and summer of 1918, an intensive study was made of the stem rust problem in Wisconsin, the chief object being to accumulate more detailed and definite information on the role of the barberry (*Berberis vulgaris*) in the spread of the stem rust of grain (*Puccinia graminis*). A brief account is here given of this work, which was carried on in co-operation with the Bureau of Plant Industry, U.S. Department of Agriculture.

The urediniospores which had formed on the new fall shoots of perennial grasses and winter grains retained their ability to grow until the winter covering of snow had disappeared, about March 5, after which time their viability rapidly decreased, no viable spores being found after March 30. Germination in February averaged less than 3 per cent., and in March less than 1 per cent.

An account with graphical illustration shows that degree of infection decreased rather uniformly with distance measured northeast from a barberry hedge, ranging from 100 per cent at 15 ft. to 10 per cent at 200 ft., 1 per cent at 300 ft., and 0.5 per cent at 400 ft. It is stated that the three strains of grain stem rust in Wisconsin go also to such grasses as wild barley, quack grass, orchard grass, and wild grass. All these strains will rust the barberry, which however is able thereafter to rust only the appropriate special hosts. New grain stem rust development was not found in advance of the time when the infection could not have come from infections on barberry.

INJURIOUS INSECTS

Grasshoppers and Control Measures.—URBAHNS, T. D., in *Monthly Bulletin, California State Department of Agriculture*, Vol. VIII, No. 9, pp. 518-528. Sacramento, Cal., Sept., 1919.

Although agriculture and cultivation have extended over vast areas of the western States, there are still large stretches of land west of the Sierra Nevada Mountains where the breeding grounds of grasshoppers remain

practically unchanged. In addition to this, many of the species have become adapted to lucerne and other cultivated fields, so that the source of a destructive grasshopper outbreak is not necessarily from the hills and dry lands as generally supposed, but severe annual losses are experienced in fields and orchards from swarms of the pest that have bred in the near vicinity.

The most destructive species occurring in California are *Melanoplus differentialis*, Thom., which apparently prefers lucerne to any other food-plant, but frequently also attacks orchards and gardens; *M. atlantis*, Riley (lesser migratory grasshopper), which breeds freely in lucerne and other grasslands and also feeds on melons, beans and many other plants; *Camnula pellucida*, Scud. (yellow-winged grasshopper), which breeds chiefly on grasslands and is destructive to native meadows, maize, oats, beans, and in young orchards and gardens; *Melanoplus marginatus*, which breeds in lucerne fields, foothills and grasslands, and is injurious to lucerne and in orchards and gardens; *Oedaleus enigma*, which breeds in large numbers in dry grasslands and is destructive in lucerne and young orchards; *Melanoplus devastator*, Scud., which breeds on dry lands and lucerne fields and is destructive to lucerne and in vineyards, orchards, gardens and bean fields; and *Schistocerca venusta*, which breeds in lucerne fields of the Imperial and San Joaquin valleys and frequently flies in swarms in maize fields. Each of these species is figured and briefly described.

In the majority of cases a recurrence of the enormous losses caused by grasshoppers could be prevented by sufficiently energetic co-operation between individuals and communities. The conditions peculiar to each infested locality should be considered independently, and a thorough knowledge of the breeding-places, habits and control measures should be acquired by every farmer. The species that prefer grass-covered slopes in the hills for their breeding-grounds hatch in early spring, feed upon the green grasses for a time and then migrate down the gulches, where they at first accumulate in great hordes. They can then be most effectively poisoned before they are able to reach the valuable crops and orchards in the cultivated areas. Grasshoppers can sometimes be driven into definite areas and concentrated for more effective control by herding a large drove of sheep slowly around the infested area. A farming community threatened with grasshoppers working their way in from range lands should co-operate and by burning a strip of grassland one-fourth of a mile wide along the edge of the cultivated area may save their land from further infestation. When waste areas and fence lines are burned to destroy the pest every precaution should be taken to ensure that the insects will not be driven ahead of the flames, and burning should preferably be done at

night. In young orchards every effort should be made to keep the grasshoppers out of the trees. Clean cultivation of orchards, fence lines and roadsides will keep the pest in check, but if the grasshoppers are already in the trees poison bran should be spread broadcast between the rows (not at the base of the trees). The insects should be regularly brushed out of the trees so that they will hop to the ground and pick up the poison. Hopperdozers have been used for many years and have caught immense numbers of grasshoppers, but the author considers poisoned bran mixtures the more practical for general use.

Grasshoppers that breed on irrigated lands first appear in May and early June along the higher ridges such as ditch banks, fence lines, etc. Poisoning should begin as soon as they have hatched and before they spread over entire fields. A formula that has been found very effective against grasshoppers consists of 1 lb. of Paris green or white arsenic and 2 quarts cheap molasses stirred into 4 U. S. gallons of water. Half a dozen chopped lemons are added and the mixture slowly poured over 25 lb. wheat bran or lucerne meal. If the latter material is substituted an extra gallon of water should be used. This is sufficient for five acres. When the area to be covered is too great to spread by hand, an end-gate grain-seeder attached to the rear of a farm wagon and geared from one of the rear wheels should be used. The poison should be spread as finely as possible and should be used while fresh. It should be applied in the afternoon, shortly before the hoppers seek their evening meal, and shortly before rather than after irrigation, and before cutting lucerne rather than when the field is bare. Two or three days later the grasshoppers generally begin to collect in the crowns of plants and other shaded spots and die in numbers, the dead insects being frequently destroyed by beetles, ants, and other insects. It is

considered that there is no danger to livestock from the poison, but it should not be left where it can be eaten in large quantities by domestic birds or animals.

The Apple Maggot in New York.—HERRICK, GLENN W., in *Cornell University Agricultural Experiment Station Bulletin* 402. pp. 89-101, Ithaca, N.Y., March, 1920.

The author discusses the distribution of the apple maggot in New York, the varieties of apples commonly infested by it, food plants of the maggot, the form, colour, and appearance of flies and maggots, feeding habits and migrations of the flies, injuries caused by the insect, seasonal history and methods of control.

The following recommendations are made:

Experiments begun in this country in 1910 and carried through subsequent years have shown that the apple maggot can be effectively controlled by spraying infested trees with arsenate of lead (paste) at the rate of 5 pounds to 100 gallons of water. In general, two applications should be made, the first during the last days of June or the very first days of July, and the second about two weeks thereafter. The spraying should be done rather thoroughly, although there appears to be no need of coating the tree as completely as one would when spraying for the codling moth, for example. The applications can be made more quickly and with less material than in usual spraying operations. All trees on the farm, especially those about the house and barn, should be sprayed to prevent the maggot from breeding undisturbed on such trees. If there is an infested orchard near by, the owner should be induced if possible to spray it as a matter of protection.

It seems probable, from the experience of practical fruit growers, that after the maggot has once been brought under control, the ordinary codling-moth sprays given after the petals fall and again three weeks later would suffice to control the flies.

AGRICULTURAL STATISTICS

FOREIGN CROP CONDITIONS

(Compiled from the International Crop Report and other sources).

United Kingdom.—The outlook at the beginning of July was encouraging but conditions have deteriorated since then. There was a heavy rainfall in July which continued into the early part of August. Harvesting was progressing slowly on account of the wet weather and decreased crops were expected. The area of wheat in England and Wales is officially reported as 1,877,000 acres against 2,221,000 last year.

France.—The crops were still favourably spoken of early in August, although the harvest was being hindered by wet weather.

Belgium.—This year's wheat crop is officially estimated as 9,050,000 bushels against 9,895,000 last year, and a pre-war five years' average of 14,984,000 bushels.

Holland.—The crops are reported to be good.

Sweden.—The crops are generally in a good condition.

Spain.—Good crops have been secured and the Government have framed regulations for their control.

Italy.—Reports of the wheat crop are very bad. The weather was unsettled in the first part of August. The Italian Food Commissioner has announced that imports of 112,000,000 bushels of wheat will be required.

Roumania.—Reports say the wheat crop has yielded so well that a surplus for export is expected. Harvesting was carried out in favourable weather.

Jugo-Slavia and Czecho-Slovakia.—Early in August the prospects were for excellent harvests in these countries.

Germany.—Reports favour good yields of wheat. The harvest was somewhat hindered by unsettled weather.

India.—It was reported early in August that good rains had improved the crop conditions in general in most sections.

Australia.—The weather has been favourable and a good wheat crop is forecasted. It is reported that the increase in wheat acreage is not so large as was expected.

South Africa.—Reports from this country are unfavourable.

Argentina.—Early in August it was reported that beneficial rains had been general. It is expected there will be an average acreage under wheat, oats and flaxseed.

UNITED STATES AUGUST CROP REPORT

The August report of the United States Department of Agriculture makes the amount of oats remaining on the farms on August 1st about $4\frac{1}{2}$ per cent of last year's crop, or about 56,420,000 bushels, compared with

93,045,000 bushels last year, and 72,212,000 bushels the average for the five years—1914-18.

The estimated condition and yields of the principal crops were as follows:

	Condition August 1, 1920.	Aggregate yield, bushels.	Yield 1919 bushels.
Winter wheat.....		533,000,000	731,636,000
Spring wheat.....	73.4	262,000,000	209,351,000
All wheat.....		795,000,000	940,987,000
Corn.....	86.7	3,003,000,000	2,917,450,000
Oats.....	87.2	1,402,000,000	1,248,310,000
Rye.....		77,900,000	88,478,000
Barley.....	84.9	196,000,000	165,719,000
Potatoes.....	87.0	402,000,000	357,901,000
Flax.....	80.1	14,300,000	8,919,000
Hay, tons.....	90.5	107,000,000	108,660,000

IMPORTS AND EXPORTS OF WHEAT AND FLOUR

(Flour expressed in equivalent quantities of wheat)

Thousands of Bushels

Countries.	Imports				Exports			
	May.		First 5 months, January 1, to May 31.		May		First 5 months, January 1 to May 31.	
	1920	1919	1920	1919	1920	1919	1920	1919
Belgium.....	2,350	319	12,450	320	55	0	110	
Great Britain and Ireland.....	14,588	19,349	83,054	59,901	37	30	190	163
Greece.....	1,149	578	4,450	2,659	7		151	
Italy.....	5,723	8,360	32,238	32,122	231	50	1,204	355
Roumania.....	2		49				10	
Sweden.....	79	188	2,464	1,040				56
Canada.....	19	9	88	28	2,755	14,577	31,075	42,269
United States.....	569	1,539	3,157	4,203	25,884	26,342	79,311	115,730
Argentina.....					36,723	8,347	136,574	21,829
India.....	1	260	7	6,242	272	196	1,491	753
Japan.....	1,107	453	4,735	2,617	0	1	6	1
Algeria.....	113	21	116	48	26	1,563	329	5,056
Egypt.....	298	50	694	619				
Tunis.....					34	530	74	1,917
Australia.....		1	1	2	6,215	11,527	41,641	44,070

DECLINE IN BRITISH SHEEP BREEDING

At the international conference held at Darlington, England, by the (British) National Sheep-Breeders' Association on June 28 a paper read by Sir Henry Rew dealt with the subject of the decline in British sheep breeding, in respect to which he gave statistical facts and discussed certain economic tendencies. Concerning the reduction in the

number of sheep in Great Britain, Sir Henry pointed out that the official agricultural returns (collected annually in June) are the only source of information, but they show the number over a period of 50 years. This period he divided into quinquennial sections, and the total stock of sheep in each such five-yearly period he found to be:

Period.	Number of Sheep.	Period.	Number of Sheep.
1870-1874.....	28,600,000	1895-1899.....	26,000,000
1875-1879.....	28,400,000	1900-1904.....	25,900,000
1880-1884.....	25,300,000	1905-1909.....	26,300,000
1885-1889.....	25,800,000	1910-1914.....	25,400,000
1890-1894.....	27,600,000	1915-1919.....	23,700,000

From the above, leaving out the war period, it appears that "after the disasters of the early eighties the flocks of the country never recovered the position they held in the seventies," and "that during the present century they have fallen substantially below the standard of the nineties." Sir Henry referred to a disturbing element in connection with these comparisons, namely, the

age at which sheep are now slaughtered: "Four-year-old wether, which used to represent the highest standard of mutton production, is now seldom seen at table. Early maturity has been adopted as a principle. It is evident that with the progressive adoption of this principle the number of sheep each year would decrease, even though the actual number bred were maintained."

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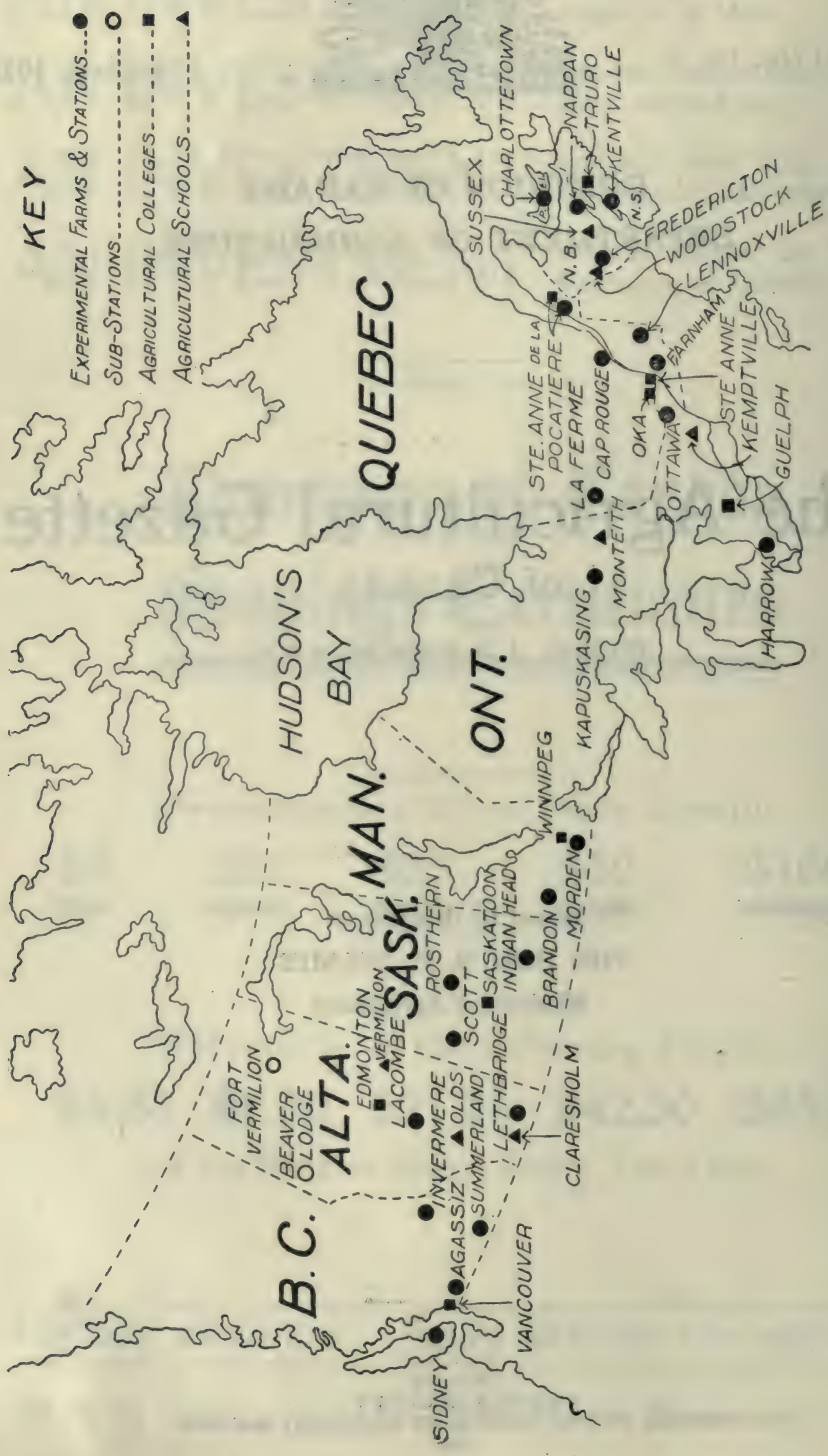
DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE

The Agricultural Gazette of Canada

EDITOR: J. B. SPENCER, B.S.A.

Issued by direction of
THE HON. S. F. TOLMIE
Minister of Agriculture

OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920



MAP OF CANADA SHOWING THE LOCATIONS OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

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RURAL LEADERSHIP

THE movement to improve the economic and social conditions in the rural districts, expressed in the summer schools for rural leaders held at the Ontario, Manitoba, and Macdonald Colleges, is not of recent origin. For generations the problem of maintaining a proper balance between rural and urban populations has engaged the attention of practical sociologists. Many of the best thinkers have been alarmed at the tendency of numbers of the most virile of the country-born to drift to the city for their life work. In conference, on the public platform, and in the press, the impetus of the movement has been shown to have grown more and more intense. The universities of this and other countries have recognized the need and are providing regular courses of study in rural sociology in an effort to remedy or at least to relieve these conditions.

One does not require the prophetic vision to be alarmed at the conditions that prevail in many of even the most favoured rural districts. The situation as revealed by well directed rural surveys has been termed by one writer as a rural crisis. It was this feeling that gave cause to the appointment and work of the Country Life Commission, whose report has been followed by further surveys, and the reaching out after measures calculated to stay or check the drift away from the land. Speaking upon this subject a few years ago, Dr. James W. Robertson said: "The land and all that it stands for has a first claim upon us for our thought, our care, and our labour. Rural life and rural conditions call for patient study and wise action for their betterment. In the past they have been too often neglected by those who were concerned for the advancement of the people and the enlargement of their opportunities."

Progress depends upon the ambitions of the human factor. The enlargement of opportunity must continue to determine the course of man. If he is to remain in the country, he must see there the opportunity for education for his family, conveniences, comfort, social and sanitary conditions for his household, and compensation for his effort, equal to those offered in the town or city. The question is broad and complex. Mr. Arthur A. Todd, Professor of Sociology in the University of Minnesota, a recognized authority on the subject, has set down six demands that are made in the work of rural reconstruction: (1) Visualize social solidarity; (2) energize the land; (3) organize farm business; (4) vitalize the rural school; (5) socialize the rural church; (6) modernize the rural home. To meet these demands, which are common alike to Canada and the United States, requires a leadership fully alive to the conditions and needs, and possessed of the power to marshal and direct

the forces available. Without such leadership the effort must fail and the problem remain unsolved. The schools for rural leadership are doing a good work in sending back to the country districts, servants of the communities inspired with zeal for the cause, and trained to impress and direct the citizens in community reconstruction. The work thus commenced may be slow in the beginning but who can foretell what may be accomplished when country districts have become properly organized under the generation now passing through the agricultural colleges and schools, junior farmers' associations, boys' and girls' clubs, rural community clubs, and other associations, organized in the interest of a better rural life!

The tendency of the movement would indicate that some day there may be established county boards of public welfare whose services include a nurse, probation officer, supervisor of recreation, visiting housekeeper, travelling librarian, charity organization society worker, and social centre director.

BOOKS ON RURAL SOCIOLOGY.

Rural Sociology is a broad subject engaging the thoughts and pens of many leaders. The library maintained by the International Institute Branch of the Department of

Agriculture at Ottawa, has a collection of books on rural sociology available for loan. The following is a brief list of selected titles, but anyone desiring a more complete record may obtain it on request:

- Proceedings of the first national country life conference, Baltimore, 1919.
- The sociology of rural life, published by the American sociology society, 1917.
- Chapters in rural progress, by K. L. Butterfield, 1916.
- Constructive rural sociology, by J. M. Gillette, 1916.
- Rural life, by C. J. Galpin.
- Play and recreation for the open country, by H. S. Curtis, 1914.
- The country life movement, by L. H. Bailey, 1919.
- Introduction to rural sociology, by J. M. Gillette, 1916.
- The country church an economic and social force, by C. J. Galpin, 1917.
- The modern village at the Ghent universal exhibition (In Bulletin of Foreign Agricultural Intelligence, May, 1914, pp. 349-53).
- Country life and the country school, by Mabel Carney, 1912.
- Rural life and education, by E. P. Cubberly, 1914.
- The rural school and the community, by H. T. Lewis, 1918.
- The rural church serving the community, by E. L. Earp, 1918.
- Rural problems of today, by E. R. Groves, 1918.
- A community centre; what it is and how to organize it (U.S. Bureau of Education, 1918).
- Village clubs and halls, by Lawrence Weaver, 1920.

SHOULD THERE BE A DEPARTMENT OF SOCIOLOGY AT THE AGRICULTURAL COLLEGE?

BY A. MACLAREN, B.S.A., ONTARIO AGRICULTURAL COLLEGE

THE answer that the reader gives to the above question will depend largely upon his idea as to the end or purpose of an agricultural college and how that end is to be obtained. An examination of the curriculum of any agricultural college in Canada will lead one to the conclusion that the authorities who have the shaping of the

course in hand have believed that the goal of the college will be achieved if the students are well informed and can skilfully apply the principle and laws that underlie the handling of soil, the growth of crops, the breeding and feeding of animals, the general skilful management of the whole farm business within the farm and the marketing of produce outside.

In other words, the average agricultural college is considered to be an institution for technical instruction—an institution for training men to farm well and profitably. If, however, we consider the college to be an institution for training men for satisfactory country life and not simply to make a living on the farm, then we immediately see the importance of introducing such a subject as sociology.

Sociology has been defined as "the science of human relationships." If it is important to determine the digestibility, palatability, and other characteristics of feeds for dairy cattle and their relationship to the profitable production of milk—is it not at least equally important to investigate and analyse the relationship of various conditions in home, school, church, and community to the satisfaction that it is possible to derive from country life? Until we recognize that the human welfare of those who live on the farm in Canada is the ultimate goal in agricultural college teaching and assign the sciences of soil, biology, and economics to their rightful places as means to that end and not ends in themselves, we can never attain the success that should attend the efforts of our colleges.

If we are to adequately deal with the whole problem a department of sociology will have to be established and developed at every agricultural college. Its objects would include, (a) investigation of country life conditions to determine social laws, (b) experimentation with these laws in trying to develop the community idea, community social centres, a programme of community activities, (c) training of local leadership for

such enterprises, (d) the co-ordination of the various agencies working in rural communities.

Its work would be divided into five different lines:

1. Investigation or research work including, (a) the outlining of problems for research, e.g., the effect of our educational system on city drift, (b) spending time in field research, (the rural community would be the sociologist's laboratory,) (c) analysing and publishing results, (d) encouraging individuals (students, preachers, teachers, etc.) to investigate problems and help them interpret the results.

2. Dissemination of results through (a) a course of lectures on sociology and community life to the regular college students, (b) writing articles for the agricultural press, (c) correspondence.

3. Demonstration and service through (a) the selection of a number of communities throughout the province to use as illustration or demonstration centres where community work would be developed, (b) holding conferences and demonstrations at normal schools, theological colleges, teachers' institutes, farmers' clubs, women's institutes, etc.

4. A service bureau which would give help to local communities through (a) package library system for debates (b) suggestions re amateur dramatics, community singing, etc., (c) exhibits such as health, child welfare, school conditions, etc.

5. Co-ordination of activities of all organizations that are attempting to do anything for rural districts in an attempt to prevent duplication and overlapping and to secure concentration of effort.

ORDERS-IN-COUNCIL

THE APPLE SUCKER QUARANTINE

THE regulations under the Order-in-Council of November 28th, 1919, to prevent the spread of apple sucker (*Psyllia mali* Schmid) have not been found effective because they do not apply to the areas now infested; because the quarantine does not include all the host plants attacked by this insect, and because they do not permit the movement of plants from the quarantined areas. Therefore, the following Ministerial order has been authorized and put into force.

NOTICE OF QUARANTINE No. 1
(DOMESTIC)

Effective on and after August 15th, 1920.

(Supersedes subsection (c) Section 12 of the Regulations under the Destructive Insect and Pest Act passed by Order-in-Council November 28th, 1919).

The fact has been determined by the Minister of Agriculture, and notice is hereby given that an injurious insect, the apple sucker, (*Psyllia mali* Schmid), new and not heretofore widely prevalent or distributed within and throughout the Dominion of Canada, exists in the Province of Nova Scotia.

Section 1.—Ministerial Order.

Now, therefore, I, Joseph Hiram Grisdale, the Deputy of the Minister of Agriculture for the Dominion of Canada, under authority conferred upon me by Section 7 of the Destructive Insect and Pest Act, 9-10 Edward VII, Chap. 31, do hereby quarantine the counties of Kings, Hants, Colchester and Cumberland, in the Province of Nova Scotia and by this notice of quarantine No. 1 (domestic) do order that no nursery stock, including all trees, shrubs and plants, vines, seedlings, grafts, scions, buds or cuttings shall be moved from any areas in said quarantined counties under conditions other than those hereinafter prescribed.

Section 2.—Definitions.

For the purpose of this order the following words, names, and terms shall be construed, respectively:

(a) Apple Sucker: To mean the insect known as Apple Sucker, (*Psyllia mali* Schmid).—

(b) Nursery Stock: To include all trees, shrubs, plants, vines, seedlings, grafts, scions, cuttings or buds.

(c) Quarantined Area: To mean any province or portion thereof quarantined upon determination that the Apple Sucker exists therein.

(d) Infested Area: Those portions of any quarantined area which are actually infested with the Apple Sucker.

(e) Inspector: An inspector duly appointed under the Destructive Insect and Pest Act. Section 3.—Area Quarantined.

For the purpose of this order the area quarantined shall include that area within the boundaries of the counties of Kings, Hants, Colchester and Cumberland, in the Province of Nova Scotia. This area may be extended or reduced, as found necessary from time to time.

Section 4.—Inspection and certification. A condition of movement from the quarantined areas.

No nursery stock shall be moved from any point within the quarantined area to any point outside that area unless the same is accompanied by a certificate of inspection, signed by an authorized inspector, which states that the said stock is free from any and all stages of the apple sucker.

In the case of any nursery stock where absolute freedom from infestation of the apple sucker cannot be determined by the inspector, certification shall be refused.

No nursery stock shall be moved within the quarantined area unless it is accompanied by a permit signed by an authorized inspector which states the name and address of the consignor, the name and address of the consignee and the ultimate destination of the shipment.

No permit of certificates shall be granted for the movement of any apple, pear, plum or quince stock, including any or all portions of the plant, from any point within the area known to be infested with the apple sucker to any point outside that area.

Section 5.—Marking of Containers.

Every car, box, bale or other container of nursery stock to which this order applies, shall be plainly marked with the name and address of the consignor and the name and address of the consignee and shall be accompanied by either a certificate of inspection or a permit.

It shall be illegal for any owner, or grower, or any person acting as agent or employee for said owner or grower, or corporation or carrying company to move, transport, or

ship any nursery stock within or outside the quarantined area unless the same is accompanied by a certificate of inspection or a permit.

This order shall not apply to shipments of nursery stock passing through the quarantined area on a through bill of lading.

Section 6.—Conditions governing inspection and issuance of certificates.

Persons intending to move nursery stock from points within the quarantined area, for which certificates of inspection or permits are required by this order, should make application therefor, as far as possible, in advance of the probable date of shipment. Applications should show the nature and quantity of nursery stock which it is proposed to move together with its exact location, the name and the address of the consignor, the ultimate destination and intended date of shipment. Applicants will be required to assemble the nursery stock for inspection and place it so that it can readily be exam-

ined. If not so placed, inspection may be refused. All charges for storage, cartage, and labour incident to inspection other than the services of inspectors, shall be paid by the shipper.

Section 7.—Shipments for Scientific Purposes.

This quarantine shall not apply to the movement of nursery stock for experimental or scientific purposes by the Dominion Department of Agriculture or the Nova Scotia Department of Agriculture.

Section 8.—Penalties.

Any person who contravenes any regulation of this quarantine or who forges, alters, or defaces any certificates or permit will be prosecuted as provided for in the Destructive Insect and Pest Act.

This order shall take effect immediately and be in force until further notice.

(Sg.) J. H. Gridale.

Deputy Minister of Agriculture.

OLEOMARGARINE

The "Canada Gazette" of September 11, 1920, announces the rescinding of the regulations relative to the importation, manufacture, and sale of oleomargarine in Canada as established by Order-in-Council of the

5th February, 1920, and publishes new regulations with respect thereto. These regulations are administered by the Dairy and Cold Storage Branch of the Federal Department of Agriculture.

IMPORTATION OF HIDES, SKINS, ETC.

With a view to the prevention of the introduction of animal diseases into Canada a ministerial order governing the importation of hides, skins, etc. has been passed. These regulations, which come within the Animal Contagious Diseases Act are administered by the Veterinary Director General. The order is published in full. Under conditions

stated in the order, the importation of hides, of horses, cattle, and buffalo, calfskins, sheepskins, goat-skins, deerskins, glue stock, bones, hoofs, and horns into the Dominion of Canada from any of the countries of Europe, Asia, Africa, South America, Central America, Mexico, New Zealand and Australia is prohibited.

IMPORTATION OF WOOL AND HAIR

Regulations established in virtue of the provisions of the Animal Contagious Diseases Act governing the importation of wool and hair have been enacted with a view to the prevention of the introduction of

disease into Canada. The regulations, which will be administered by the Veterinary Director General are published in the "Canada Gazette" of September 11, 1920.

INSPECTION OF PRESERVED FRUITS, VEGETABLES, AND MILK

BY Order-in-Council dated the 27th day of August, 1920, the regulations governing the inspection of preserved fruits, vegetables, and milk, established by Order-in-Council of the 15th of June, 1918, are rescinded and new regulations put into force. These regulations cover the containers, the contents

thereof, and the labelling. Apples, apricots, berries, peaches, pears, plums, beans, corn, peas, pumpkins, and tomatoes. Copies of these regulations are obtainable from the Meat and Canned Foods Division of the Health of Animals Branch of the Department of Agriculture at Ottawa.

THE ANIMAL CONTAGIOUS DISEASES ACT REGULATIONS AMENDED

BY Order-in-Council the regulations under the Animal Contagious Diseases Act established by Order-in-council of November 30th, 1909, and amendments thereto, have been further amended by adding

the following section immediately after Section 88:

"88½. No person shall deface, conceal, or take out, wholly or in part, any permanent mark which under direction of the Veterinary Director General has been applied to cattle reacting to the tuberculin test."

Women everywhere are welcoming the services of the home demonstration agent much as farmers welcome the agricultural county agent. This trained home economics worker, employed on federal, state and local funds, and devoting all her time to the advancement of home efficiency, is studying with home-makers the needs of individual homes and communities, and is thus able, by linking her technical skill with the practical knowledge and experience of the housewives, to co-operate in the accomplishment of large results by providing a channel through which the state agricultural college and the Department of Agriculture can deal directly with rural home-makers.

Florence E. Warren in The Banker Farmer.

PART I

Dominion Department of Agriculture

SEED BRANCH

FIBRE FLAX PRODUCTION

BY GEO. H. CLARK, B.S.A., SEED COMMISSIONER

FOR the purpose of encouraging the production of fibre flax in Canada, the Seed Branch of the Federal Department of Agriculture, and the Canadian Seed Growers' Association have imported and distributed fibre flax seed, have had the resultant crop officially inspected, and are taking the further necessary steps to grade the seed for marketing purposes.

In the spring of this year, the Canadian Seed Growers' Association imported from Holland, 700 bushels of suitable seed. This they sold to flax growers in Western Ontario, and afterwards carried out the field inspection of the crop. The cost of this inspection was made by the

growers. The Seed Branch makes an inspection of the seed and issues certificates accordingly. These certificates note the quality of seed as indicated by the field inspection and also the quality and grade of the seed itself. The certificates are identified with the sealed sacks, which must contain seed of uniform quality and otherwise conform to regulations of the Seed Branch.

Purchasers of this seed, whether in Ireland or elsewhere, are fully advised as to the precise meaning of the different grades of seed for which certificates are issued.

This system is an enlargement of the system of inspection provided last year, and which proved generally satisfactory.

SEED INSPECTION SERVICE

BY GEO. H. CLARK, B.S.A., SEED COMMISSIONER

THE Seed Branch has arranged to offer its service of inspection and official grading to producers of seed in the province of Ontario, provided that the quantity to be inspected at each point amounts to at least one car-load. This extension of the service of the Seed Branch is in natural sequence to a

recommendation made at the Field Crop Conference held in Toronto in January last. At that Conference it was recommended that steps be taken to promote the production of improved seed in commercial quantities by the organization of seed centres.

DAIRY AND COLD STORAGE BRANCH

APPOINTMENTS AND PROMOTIONS

SEVERAL changes have been made in the personnel of the staff of the Dairy and Cold Storage Branch. These include the chief of the Division of Extension of Markets, Supervisor of Cow Testing for Alberta, and positions in connection with inspection of dairy products.

Mr. J. F. Singleton has been appointed successor to Mr. W. W. Moore, resigned, as chief of the Division of Extension of Markets. Mr. Singleton will have immediate charge of refrigerator car services and cargo inspection in Canada and the United Kingdom, and will also be responsible for the publication of the Dairy Market Report and the monthly Dairy News Letter. Mr. Singleton's wide experience in the manufacturing and marketing of dairy products, his technical training and experience in connection with milk and its products, and his general acquaintance with the dairy trade in Canada as a whole, qualify him to fill this position in a satisfactory manner.

Mr. A. G. Moore of Vermilion, Alberta, has been appointed Supervisor of Cow Testing for Alberta to

succeed Mr. M. B. Sorenson of Red Deer, Alberta, who resigned in order to engage in creamery work.

Mr. H. W. Coleman has been appointed Dairy Produce Grader at Montreal. After graduating from high school Mr. Coleman learned cheese and butter making and acquired a high standing in that capacity. He is a graduate of the Kingston Dairy School and took the agricultural course at the Ontario Agricultural College, Guelph. For several years he was employed on the dairy staff of this Branch, which position he resigned in the spring of 1918 to accept that of Dairy Superintendent for the Province of New Brunswick. During the two and a half years in which he has been the guiding spirit of New Brunswick dairying the industry in that province has made distinct progress.

Mr. R. N. Kidd of Ottawa has been appointed Dairy Produce Market Reporter and Refrigerator Car Inspector at Toronto.

Mr. L. O. Tubman of Munster, Ontario, has been appointed Inspector of Dairy Products for Western Ontario, with headquarters at London.

ENTOMOLOGICAL BRANCH

MR. ARTHUR GIBSON, DOMINION ENTOMOLOGIST

THE Civil Service Commission and the Department of Agriculture announce the appointment of Mr. Arthur Gibson as Dominion Entomologist, which title is given to the head of the Entomological Branch of the Dominion Department of Agriculture. The position was formerly held by Dr. C. Gordon Hewitt, whose death occurred in February last.

Mr. Gibson has had a long and wide experience as an entomologist. He has been associated with the

Entomological Branch since it was created, previous to which he had an excellent training under the late Dr. James Fletcher, who was a recognized leader in applied entomology. At the time of his promotion, Mr. Gibson was the senior divisional chief of the Branch and had the direction of all field work in Canada, being chief of the Division of Field Crop and Garden Insects. Since Dr. Hewitt's death he has been the Acting Dominion Entomologist. During his connection with the Department of

Agriculture he has published many papers and memoirs. Some of the department publications prepared by him are "Cutworms and Their Control"; "The Cabbage Maggot and Its Control in Canada"; "The Army Worm"; "Common Garden Insects and Their Control"; "Locusts and Their Control"; "Borers in Corn, etc."; etc. Recently he published a memoir on the Lepidoptera collected by the Canadian Arctic Expedition, 1913-14.

Mr. Gibson is a fellow of the Entomological Society of London,

(Eng.); Fellow of the Entomological Society of America; Fellow of the American Association for the Advancement of Science; President of the Entomological Society of Ontario; Associate Member of the American Association of Economic Entomologists; Editor of the Canadian Field-Naturalist; Councillor of the Agricultural Club of Ottawa; Ex-President of the Ottawa Field-Naturalists Club, member Canadian Society of Technical Agriculturists, etc.

TWO NEW AND IMPORTANT INSECT PESTS RECENTLY FOUND IN CANADA

LEONARD S. McLAIN, M.SC., DIVISION OF FOREIGN PESTS SUPPRESSION

THE EUROPEAN CORN BORER, *Pyrausta nubilalis* Hübner

IN July 1917 the European corn borer was found in the vicinity of Boston, Massachusetts, doing serious damage to the corn fields, especially sweet or table corn. In January, 1919, the same pest was found in Schenectady County, New York, and later in the season was discovered in the western portion of the state, bordering chiefly on the shores of Lake Erie. Upon its appearance in western New York the Entomological Branch took steps in an endeavour to determine whether the pest had invaded Canada. This was done by tracing up shipments of plant products likely to harbour the borers, from localities infested by the pest and imported into Canada, and also by the issuing of a warning poster calling the attention of the public to the danger of this pest. These posters were widely distributed throughout Ontario, Quebec, and the Maritime Provinces. As a precautionary measure an embargo was placed on the importation of corn from the areas infested in the United States. Soon after the European corn borer was found in western New York scouting work for the insect was carried on in southern Ontario but owing to the lateness of the

season and the presence of snow on the ground this work was discontinued.

Early in the spring of this year a new edition of the warning poster was issued and spread broadcast, special attention being paid to southern Ontario bordering the shores of Lake Erie. When the corn first came into tassel, early in August, scouts were despatched to the so called "danger zone", and on August 10th Messrs. Keenan and Simpson of the Division of Foreign Pests Suppression, found some suspicious looking larvæ infesting corn at Lorraine Station, Welland County. The caterpillars were small and the amount of infestation was very light; as the scouts continued their work eastward and along the lake shore they noticed that the intensity of the infestation increased until it was finally centered in the vicinity of Ridgeway and Crystal Beach. In the meanwhile their first collections of caterpillars were submitted to headquarters for identification. The larvæ were referred to Dr J. H. McDunnough, Chief of the Division of Systematic Entomology who identified them as specimens of the European corn borer, *Pyrausta*

nubilalis Hübner. Specimens were also forwarded to the specialists in charge of the European corn borer investigations in the United States and they confirmed Dr. McDunnough's determination. An effort was immediately made to find the limits of the infestation, and according to latest advices this extends from Fort Erie on the east to Dunnville on the west along the Lake Erie shore, and about twenty miles inland.

On August 23rd, Mr. A. E. Mitchell, a farmer in the vicinity of St. Thomas, Ont., submitted samples of caterpillars which he reported to be damaging his corn. Upon examination these larvæ also proved to be the European corn borer. Scouts were immediately ordered to investigate the outbreak and reported that five per cent of the plants in the fields examined were infested by the pest.

Intensive scouting was then started and an attempt made to connect the first infestation and the St. Thomas outbreak; so far this has been unsuccessful, no borers being found between Dunnville and Straffordville (Elgin County). Judging from the results of our scouting work to date (Sept. 5th) the so called St. Thomas outbreak is more intensive and widespread than is the infestation further east. The former, known as infestation number two, extends from Straffordville (Elgin County) on the east to Rodney on the west, and Strathroy on the north. The limits of both infestations, however, have not been definitely settled as the scouting work is still being continued. The heaviest infestations found so far are in the townships of Yarmouth and Southwold in Elgin County. One field of corn, consisting of about four acres gave the following results. Four full length rows some distance apart and picked at random were used for the estimate. The corn was planted in hills with an average of four

stalks to the hill. A count was made of the exact number of hills and of the exact number of the same hills infested.

Hills of corn in four rows 688

Hills infested in four rows 549

Per cent infested 79.8

The 79.8 per cent of plants infested does not indicate the amount of damage or that 80 per cent of the crop will be lost, but merely shows the number of stalks infested by one or more borers.

THE SATIN MOTH, *Stilpnotia salicis* L.

In the latter part of July Messrs. Tothill and Baird, field officers of the Entomological Branch were investigating an outbreak of tent caterpillars in the vicinity of Vancouver and New Westminster B.C., and while at the latter point noticed some caterpillars feeding on poplar trees. A collection of the caterpillars was made and the moths reared. The latter were forwarded to Dr. J. H. McDunnough, Chief of the Division of Systematic Entomology, for identification, and they were determined by him as adults of the satin moth *Stilpnotia salicis* L. The satin moth is an old world pest and is found in Europe and Asia. It is injurious in that it often severely attacks poplars and willows; furthermore, it belongs to the same family as those dangerous pests the gipsy and brown tail moths. The first record of the satin moth on this continent was made last spring, when it was discovered in the vicinity of Boston, Massachusetts. The present outbreak in New Westminster is being investigated and if the infestation is not too widespread an endeavour will be made to bring about its eradication, on account of the danger of its becoming a serious pest on poplars and willows which are abundant in southern British Columbia.

PART II

Provincial Government Departments

RYE

Fall rye is a valuable crop in the Prairie Provinces for several reasons and its increased use under dry farming conditions is being encouraged by leading agriculturists of the west. At the conferences recently held at Winnipeg and Swift Current, several leading authorities pointed out its various uses and showed it to be a crop of wide adaptations. Rye has the ability to make fair growth under some unfavourable conditions and under good conditions it gives excellent results. Not only is fall rye a crop suitable for the prairie conditions, but it is proven to be a valuable crop in parts of Ontario and Quebec. It gives comparatively high yields of grain, makes a good early pasture crop, and is hardy. A specially valuable feature of the fall rye is that it utilizes the moisture of late fall and early spring, which is a valuable feature especially in some arid areas. Owing to the increased interest being taken in rye throughout Canada, statements from a number of the provinces showing what each is doing to encourage the growing of that crop and improve its quality and productivity, are brought together in the following pages.

SASKATCHEWAN

BY L. E. KIRK, B.S.A., ASSISTANT PROFESSOR IN CHARGE OF FORAGE CROP INVESTIGATIONS

THE growing of winter rye as a grain crop has received considerable impetus in Saskatchewan during the last two years. It is safe to say that the acreage seeded to this crop during the next few years will be enormously increased. The main reason for this is that certain areas have suffered considerably from drifting soil. Summer fallow that is sown to winter rye in August or early September is not subject to soil drifting either in the fall, winter, or spring because the crop occupies the land during this period. It is chiefly through discussions dealing with this problem that winter rye has received so much publicity.

At the Dry Farming Congress held at Swift Current during the past summer the use of winter rye was highly recommended by several prominent speakers who have made an extensive study of dry farming

problems and especially that of drifting soil.

In certain localities where the Russian thistle is a menace winter rye is making a place for itself because it commences growth quite early in the spring and does not give the weed a chance to develop until the crop is harvested.

As a crop to combat the hot, drying winds of June and July farmers are finding winter rye extremely useful. With its early start in the spring the rye makes its growth before the hot winds begin. Instead of these retarding the crop and causing it to wilt on account of excessive transpiration as so often occurs with wheat and oats, the result is to hasten maturity. While the yield may be considerably lessened under such circumstances, the crop is always a sufficient length to cut and the heads usually contain

grain of sufficient size to make a fair yield.

On account of its early maturity and complete possession of the land in the spring, the rye crop is of particular value in combating wild oats. Also, in dry years, when it is evident that there will be shortage

considerable importance in the near future. Since practically all of these advantages are due to the fact that rye can be sown in the fall it is evident that spring rye will not be nearly as valuable. Fall rye also gives a greater yield.



WINTER KILLING FROM LATE SEEDING

of feed, rye may be cut for hay thus enabling the farmer to carry over his stock instead of disposing of them at a sacrifice.

In addition to these and some other advantages, winter rye is making rapid strides as a grain crop and promises to take a place of

The provincial Department of Agriculture is encouraging the growing of the crop to some extent in certain parts of the province by obtaining seed and making it readily available to farmers.

ALBERTA

BY G. H. CUTLER, B.S.A., PROFESSOR OF FIELD HUSBANDRY

RYE has been grown in Alberta for the past fifteen years or more. Not until the last five years, however, has its merits as a farm crop been generally recognized. During that time the acreage devoted to its use has rapidly increased. Owing to the

fact that winter rye has proven considerably more productive than spring rye, it is grown much more extensively; in fact, almost to the total exclusion of spring rye. Owing to the wide variety of uses to which winter rye can be put, and the fact that it can be readily adjusted to

cropping systems, it seems destined to become a very popular crop in the economy of general farming in Alberta. Reports concerning its suitability have come to hand from all parts of the province, even far beyond present settlement in the Peace River District.

Among the many uses to which winter rye is put the following are the most important:—

1. A summer, fall and spring pasture for all classes of stock.
2. A hay crop when cut in the milk stage.
3. A silage crop.
4. A grain crop.

Winter rye was probably brought into Alberta from Eastern Canada, Manitoba, and the Western States, by interested settlers. These strains or varieties thus introduced have since become mixed through natural crossing and otherwise, until today, really only one variety consisting of a mixture of varieties, is recognized. This one is grown very widely and for want of a better name has been called Alberta Rye. Three years ago the Department of Field Husbandry, of the University of Alberta, introduced a new variety known as North Dakota No. 959. This variety



INSPECTING PLOTS OF WINTER RYE IN THE EXPERIMENTAL PLOTS, ALBERTA COLLEGE OF AGRICULTURE

5. A protective crop against soil blowing.
6. When sown in strips on the fallow it checks soil drifting and incidentally serves as a trap for snow which when retained covers the surface of the soil and checks the soil drifting during the winter months and upon melting increases to some extent, the moisture content of the soil.
7. When sown in April, May, or June and pastured during the summer it develops a heavy root system which aids in replenishing soil fibre.
8. Its vigorous growth in fall and spring holds annual and winter annual weeds at bay.
9. It helps to distribute the cropping season over a larger part of the year and aids in making the best use of our peculiar type of precipitation.

has been grown in comparison with the so-called Alberta Rye, and has proven its superiority in point of winter hardiness and productiveness, having outyielded Alberta Rye by nearly 10 per cent.

During the spring of 1919, another new variety was introduced under the name of Rosen. This rye has been tested only one year, but it gives splendid promise. It was developed at the Michigan Agricultural Experiment Station, and has been tested in many of the American States with marked success. Both of these varieties are being kept pure through

isolation and are being improved year by year through a process of head selection.

For several years the growing of winter rye has been encouraged by the Minister of Agriculture, not as a crop to supplant other useful money crops, but as a valuable adjunct to suitable fodder and pasture requirements and as a solution to many of our existing problems in the management of soils. Press articles have been regularly arranged for and about a year ago a circular on winter rye was published and widely circulated to the crop growers in all parts of the province.

Much experimental work is under way at all stations throughout the province with a view to demonstrating the best methods of growing

and making use of the winter rye crop.

The policy of the Department of Field Husbandry of the University of Alberta is to carry out investigations with a view to overcoming the chief limiting factor in the production of winter rye, viz: winter killing. This is being attempted through the introduction of new varieties and strains; by the improvement of present varieties through head selection, and by extensive experiments in the growing or management of the crop. As fast as new varieties promise greater hardiness than the older ones, they will be rapidly distributed to all farmers desiring them. Already many samples of the North Dakota No. 959 have been sent out for testing.

BRITISH COLUMBIA

BY P. A. BOVING, PROFESSOR OF AGRONOMY, COLLEGE OF AGRICULTURE

RYE is grown in British Columbia to a very small extent and seedsmen and farmers alike only know this grain as winter rye or spring rye. Even with this distinction one is just as liable to receive the one as the other when buying rye in the open market, and we have had several unpleasant experiences at the University Farm in this respect. During the last four years we have obtained spring rye on three different occasions when ordering fall rye from otherwise reliable seedsmen.

As stated above, this grain is not extensively grown in British Columbia, where grains generally are of less importance than forage and fodder crops. One might say that its chief use is as part of a cover crop mixture for orchards. Results so far obtained in the experiments of the Agronomy Department seem to indicate that the rye plant deserves more attention, in that it supplies an abundant yield of early feed in the spring and, when left for ripening, gives considerable weight of both straw and grain.

The greater part of the land on the Pacific slope consists of comparatively light, sandy, gravelly soil on which rye is a better crop than wheat. The pine forest soil, besides, is very often somewhat acid, and the rye will endure a greater amount of acidity than other grains. While the rye is more winter resistant than wheat, it does not stand heavy precipitation and this may be one of the reasons why rye has not won more favour.

Among varieties so far tested the Petkuser has given us better satisfaction than others, with the exception of a couple of strains produced by the Department. There are varieties of Danish and Swedish origin which out-yield the Petkuser rye, but these varieties generally are somewhat weak in the straw and they are, therefore, less adapted to good soil conditions.

The Petkuser rye, in comparison with other rye varieties, has a large grain of light greyish green colour which makes it attractive for the

trade. The grain, however, is comparatively light in bushel weight, particularly if the rye is harvested before being absolutely mature. It is, therefore, advisable to let it ripen thoroughly and have it well dried before hauling and threshing. The straw is somewhat coarser and better upstanding than most other varieties.

Owing to limited space, breeding work with rye has not been conducted on an extensive scale so far, rye breeding requiring considerable acreage or at least possibility for satisfactory isolation by distance. The same difficulties meet us in breeding rye as those encountered by the corn breeder, in that the plant is more or less dependent upon pollen from outside plants. Where testing work with various varieties and breeding work with one or more varieties are conducted simultaneously, and where the acreage is somewhat limited, it

is almost impossible to prevent undesirable cross fertilization. Rye breeding is best conducted on islands or in isolated areas where one variety is taken up in each place. It is carried on very much like corn breeding, the only difference being that, whereas the "Ear to Row" system prevails in corn breeding, the "Plant to Row" system should be adopted in rye breeding. This, at least, is the method by which Petkuser rye has been developed and the one which we are trying to follow in our work here.

Until greater demand has been created for rye as a field crop, and until a larger area is available for breeding work, it is not the intention of the Department of Agromony to extend the breeding work with this particular plant beyond what is needed for general study and instruction purposes.

SUMMER SCHOOLS IN AGRICULTURE

Summer schools in agriculture are now held annually in most of the provinces in Canada. The schools are held, where practicable, at the agricultural colleges. The attendance is made up of rural school teachers and inspectors. The courses given are designed to better prepare the teachers to give instruction in elementary agriculture, including the management of school gardens. At these schools such studies and practices are carried out as may enable the teachers to qualify for diplomas or other certificates which entitle them to official recognition. Following are reports of these schools held in several of the provinces.

NOVA SCOTIA

ONE hundred and ten students attended the summer school at Truro. It was held under the direction of Mr. L. A. DeWolfe, B.A., M.Sc., Director of Rural Science Schools. The subjects taken up included entomology, ornithology, home economics and other related subjects. Among the more particular subjects taken up was the consideration of rural rest rooms, the adoption of which was urged in all rural villages and towns. An important feature in the life of the school this year was the lecture

course which all students taking diplomas were expected to attend. These lectures were given by members of several professions and industries representing a wide variety of interests. The theme running through all was educational improvement and the welfare of society.

Adjacent to the building where the school was held a school garden had been planted. The planting had been done by the Normal students of the year. The garden was cultivated during the course by the students of the Summer Course, each student

choosing his own plot and being responsible for it. The Home Economics Course was in charge of Miss Helen MacDougall, Superintendent of Women's Institutes. Laboratory instruction was given to the students in groups of eight, in order that all might feel the advantage of it. A feature of the school was a picnic at which the students

collected botanical and entomological specimens. The desks and other school furniture had been cleared out and replaced by small tables, comfortable chairs, a piano, victrola, and book cases, making a well furnished room. The students were encouraged to become familiar with this room by being allowed to use it for writing and conversation.

NEW BRUNSWICK

AT the New Brunswick School, the students lived under canvas, military bell tents being chiefly employed. The school was put under a camp committee elected from among themselves. The members of the school took turns in

The purposes underlying farm practices were demonstrated and explained. A feature of the school was the school gardening work. Occasion was taken to give the teacher pupils practical instruction in gardening. To this end each student was required



CLASS OF RURAL TEACHERS RECEIVING INSTRUCTION IN THE CLASSIFICATION OF WHEAT

camp duties, such as the serving of meals. Five, one-hour, lecture periods were given each day to both the first and second year classes. The work was made as practical as possible. Plants were seen and studied in their natural environments.

to put in one or more plots in the school garden. They did the marking out, cultivating, staking, and sowing the seed. The garden itself is a laboratory practice garden where the teacher must do the things she would demonstrate to her pupils.

The school is carried out under the direction of Mr. A. C. Gorham, M.Sc., Director of Elementary Agriculture. The instructors were, for Nature Study, William McIntosh;

Physics of Farm and Home, Dr. F. E. Toheelock; Cereal Husbandry, O. C. Hicks; Gardening, A. C. Gorham.

ONTARIO

BY J. B. DANDENO, PH.D., INSPECTOR ELEMENTARY AGRICULTURAL CLASSES

AS has already been pointed out in the May issue of *"The Agriculture Gazette,"* courses in agriculture have now been provided at three centres in Ontario,—the Ontario Agricultural College, Guelph; the Ontario Ladies' College, Whitby; and the Ontario Govern-

In many respects these courses in agriculture for teachers are the most important and far-reaching of all the agricultural courses given in Ontario, because, through the teachers, they have more to do with the shaping of the minds of the rising generation in such a way as to develop a mental



RURAL TEACHERS RECEIVING PRACTICAL INSTRUCTION IN GARDENING AT THE SUMMER SCHOOL

ment Demonstration Farm, Monteth. The session in each institution extended over five weeks—July 5th to August 6th inclusive. On account of the continually increasing attendance at these special summer courses in agriculture for teachers a fourth centre may be necessary in 1921 or 1922.

attitude more in harmony with rural conditions. Not only do these courses so direct the rural mind at an early age and thereby produce lasting impressions, but they assist materially in showing how the farms may be made more productive and therefore more profitable, thus providing the economic incentive necessary for a happy life on the farm.

GUELPH

The attendance at Guelph in 1920 was as follows:—Part I Elementary, 153; Part II Elementary, 145; Part I Intermediate 32; Part II Intermediate, 26; Public School Inspectors, 8; Total 364, (280 women and 84 men).

Accommodation in residence at the College could not be arranged for all, consequently only the women were provided with rooms and board on the grounds. The men were obliged to secure their own board and rooms at private houses, chiefly in the city. The new dormitory building now approaching completion will be available in 1921, consequently all those who attend the summer courses at Guelph will likely, hereafter, be accommodated in residence at the College. One of the important advantages of these summer courses is the privilege of partaking, to a certain extent, of college life by living in the dormitories and dining in the hall and these advantages are not among the least important.

The instruction is given by the college professors and other members of the staff, and relates directly to the teaching of agriculture in the schools. The elementary classes refer directly to the public and separate schools and the intermediate classes to the high schools.

The work is made as practical as it is possible to make it and those in attendance appreciate this feature, more particularly because practically all of the scholastic education obtained by the teachers in their previous courses of training, had to do with books. It should also be pointed out that the courses are truly courses in agriculture and not nature study.

In addition to the regular courses, special lectures were given to all of the classes in attendance by President Reynolds, Dr. Eric Clark and Professor Crow.

MONTEITH

BY H. E. RICKER, PRINCIPAL OF SUMMER COURSE

Summer School in Agriculture for public school teachers was held in Monteith from July 6th to August 6th, concurrently with similar courses at Guelph and at Whitby.

ATTENDANCE

The attendance at this school was twenty-three. This was smaller than was anticipated, as over sixty teachers of Northern Ontario signified their intention of attending. Just why so many failed to come, after putting their names on a tentative list, has not been satisfactorily explained.

The interest and enthusiasm of the class were as great, however, as if many more were present.

The teachers came from widely separated places; from Rainy River, Manitoulin, Port Arthur, Sault Ste. Marie, North Bay, and many intervening points on the C.P.R., and along the G.T.R., and T. & N.O. lines from Barrie to Porcupine.

Three of the staff and all of the students were lodged and boarded in the building erected on the demonstration farm and formerly used in connection with the soldiers' re-establishment work of the Ontario government. Two large dormitories accommodated the students, each dormitory being divided by means of curtains into compartments containing three or four single beds each. The dining-room was large, bright and airy, and the food and service were excellent.

A large room was set aside for reading and recreation and contained a piano, a victrola, cases of books and other equipment. In addition to this there was a classroom on the second floor, and a working laboratory in the basement.

NATURE OF INSTRUCTION

The subjects of the course were exactly the same as those of similar courses in the other Summer Schools

of the province, and the successful students will obtain Part I of the certificate in elementary agriculture. The details of the work, however, were varied to suit the locality and its needs. For instance, in field husbandry, the instructor gave a lecture and demonstration on land clearing, and the ways of making early use of the new land. The class was taken out to an uncleared part of the farm, and shown how it is logged, how stumps are blown out, pulled, and piled for burning, and the land made ready for the plow.

ever possible, the students were taken to see the operation of farm machinery, and often given a chance to take part in using it.

The school garden afforded a striking illustration of the rapidity with which land can be put into shape for use. In order to secure soil that could be easily worked, no matter what the weather was, it was necessary to clear a sandy part of the farm some little distance from the school. This land was in the rough on June 1st. When the class arrived in July, it had been



MONTEITH SCHOOL GARDEN AS IT WAS ON JUNE 1, 1920

Then the tractor and disc harrows were put on a newly-plowed portion and each student had an opportunity of guiding the implement around the field. Part of this piece of land was later used for the school garden.

Throughout the course the work was made as practical as possible. Each student made the Babcock test for butter fat, had a share in the care of incubators, trimmed tomato plants, planted and cared for a garden, collected insects, weeds and weed seeds for study, recorded weather observations, performed experiments on soils, and did other work in laboratory and field. When-

cleared, plowed and rolled. On the third day of the course the class took part in discing it with the tractor. Early the second week the students completed the preparation of the garden plots, planted the usual garden seeds and later, potatoes, corn, cabbage and tomatoes. Several days before the close of the Course the students had radishes and onions for their tables from their own plots, and much garden material was left ready for the use of the students taking the Domestic Science Course in August.

All the resources of the demonstration farm were available for the

use of the teachers, and their classes. In the experimental plots they saw the efforts being made to determine

and Yorkshire swine, as excellent pure-bred specimens of these were on the farm.

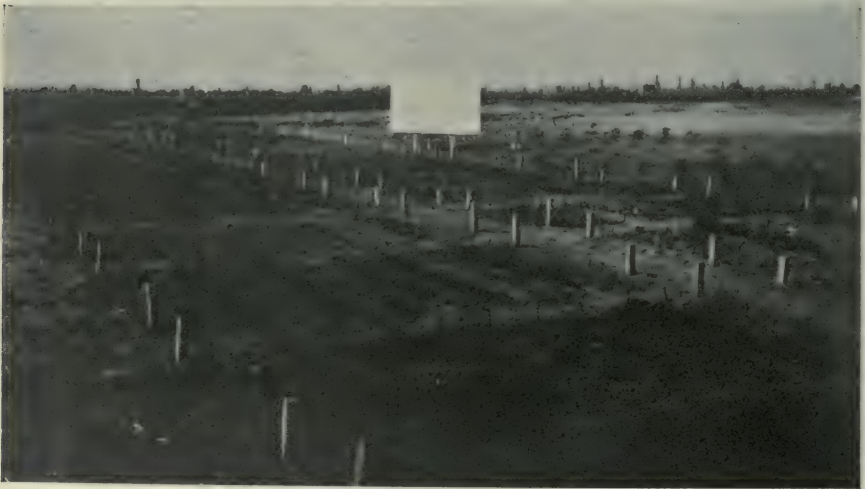


MONTEITH SCHOOL GARDEN BEING PLANTED ON JULY 14, 1920

what varieties of grains and legumes are best suited for Northern Ontario, and especially the work being done with sunflowers to be used as a silage crop.

EXCURSIONS

Two special educational trips were taken on two of the Saturdays. The first one was to Englehart to visit the greenhouse and grounds



MONTEITH SCHOOL GARDEN AS IT WAS ON AUGUST 6, 1920

In animal husbandry the emphasis was laid upon Clydesdale horses, Shorthorn cattle, Shropshire sheep

maintained by the T. & N. O. Railway in connection with their work of beautifying stations.

Here the students learned practically what plants are most useful for out-of-door decoration, how to make a new lawn, a perennial border, and how to propagate the plants used. Mr. Kerrigan, who has charge of this work, gave an excellent talk and demonstration of methods of care and cultivation. The students should be able to put this knowledge to practical use in beautifying school grounds.

The second trip was to Iroquois Falls to visit the Abitibi Power Company's pulp and paper works.

for playground ball and for volley ball, and an adjacent tennis court was much used. Indoor games were also arranged for and carried on, sometimes under supervision of the staff, more often as the students, themselves, felt inclined.

A Pathescope and many films were loaned by the Department of Agriculture and Ontario Motion Picture Bureau, so that whenever desired it was possible to have an evening of enjoyment and instruction. In addition to this, on two evenings, good musical and literary program-



TEACHER PUPILS AT SUMMER SCHOOL RECEIVING A LESSON IN DRAUGHT HORSES

The Company furnished guides who showed the class in groups through the plant, demonstrating the whole process of the manufacture of paper from the time the logs enter the mill until they are turned into rolls of newsprint, ready to be shipped. After this the Company's landscape gardener conducted the class through the town, showing the work of beautification in progress.

PROVISION FOR RECREATION

The necessity of recreation for the students was not lost sight of. On the campus provision was made

mes were rendered by members of the school.

RESULTS

The most tangible result of the course is the professional qualification which the teachers-in-training obtain, enabling them to teach agriculture in the public schools of the province. But greater than this, it is hoped that they have gained a vision of the value of the subject as a means of educating the boys and girls under their care, and a wider outlook on agriculture as a science and an art toward which they can direct their students in choosing a vocation.

SASKATCHEWAN

BY G. H. LING, DEAN OF ARTS, DIRECTOR

THE fourth summer session for teachers was held at the University of Saskatchewan, Saskatoon, and continued from July 5 to August 13, inclusive. The arrangements made were the result of co-operation between the provincial Department of Education and the University of Saskatchewan.

So far as the teachers' classes were concerned, instruction was given in the following subjects:

- (a) Agriculture, including Nature Study and School Gardening.
- (b) Agriculture and Science.
- (c) Education.
- (d) Household Science.
- (e) Manual Training.
- (f) Art.
- (g) Hygiene and Physical Culture.
- (h) Music.
- (i) French.

The organization of the work, except in education, was as follows:

In the course of two consecutive summer sessions a teacher may plan to do a definite amount of work consisting of four parts called *quarters*. For teachers attending for the first time the halves of the sessions constitute the *first* and *second* quarters. Returning for the second summer session they may take work in continuation of their earlier work and for them the session constitutes the *third* and *fourth* quarters. On the other hand qualified students may enter on any one of these quarters.

To be admitted to the teachers' classes, applicants are required to submit official evidence of being the holders of teachers' certificates

of the third, second, or first class, or of certificates in special subjects such as agriculture, household science, manual training.

The degree classes open to candidates for a university degree include instruction in animal husbandry, biology, chemistry, and field husbandry.

The number of registrations in the teachers' classes in agriculture, including nature study and school gardening, science, manual training, and household science was not, by reason of special conditions existing in the province, as large as was expected. From the reports made by the several instructors, however, good results were obtained by the students.

The social features of the session included an informal reception for all students. This proved to be an enjoyable introduction to the work of the school. Tennis tournaments were organized and proved very successful. The instructors in physical training and music co-operated with the students in connection with the recreational features of the session.

Certain radical changes in the courses offered are contemplated before the holding of the next summer school with a view to securing the attendance of a greater number of teachers.

It is generally felt that the present system of dividing up the work into *quarters* may have had a somewhat deterrent effect on the attendance at the summer session.

BRITISH COLUMBIA

BY J. W. GIBSON, M.A., DIRECTOR, ELEMENTARY AGRICULTURAL EDUCATION

TEACHERS' summer courses opened in Victoria on July 5th and closed on August 6th. Courses were offered in rural science, manual training, household economics, art, primary grade work, vocal music

and elocution, penmanship, and physical culture. The total enrolment was 184 which was considered very satisfactory in view of the fact that the University of British Columbia offered summer courses this year for

the first time and had the remarkably good enrolment of 128 reachers.

The Victoria Summer School, as formerly, was conducted by the provincial Department of Education, which department paid the transportation of the teachers attending to and from Victoria. The courses offered were similar to those given in former years with the addition of three new courses—one for primary grade teachers which proved to be very popular, one in penmanship, and one in physical training, school games, etc., which were also largely attended.

Two special lecture courses were given during the last week of the

session, one on the problems of the ungraded school—a very excellent series of five lectures by Arthur Anstey, B.A., Inspector of Schools for New Westminster and the Lower Fraser and the other by Professor O. J. Kern of the University of California—six illustrated lectures on agricultural education and the rural school. These special courses were attended by the entire student body.

A splendid spirit prevailed throughout the entire school and on the whole it can be estimated as our most successful summer school to date.

SCHOOLS FOR RURAL LEADERSHIP

Schools for rural leadership have been carried on at several of the colleges in Canada for a number of years. The attendance has been composed largely of clergymen of Protestant churches occupying rural charges. The courses are intended to familiarize ministers with agricultural methods and to otherwise fit them to be of more practical assistance to the farming community and to take a leading part in the upbuilding of the rural community. These schools were held this year at Macdonald College, at the Ontario Agricultural College, and at the Manitoba Agricultural College.

QUEBEC

MACDONALD COLLEGE

A Summer School for Rural Improvement for country clergymen and others interested in rural welfare, was held at Macdonald College, August 3rd to 13th. There was an attendance of seventy-three men and one woman. The sentiment of those who attended was expressed in a resolution of thanks to the officials of the colleges which was introduced by an appreciation of the benefit received from the courses, which included the reshaping of conclusions as to the motives which are adequate to govern industrial life; a clearer understanding of the significance of the social side of country life, and

of the means to afford the farmer his reasonable share of social progress; the forming of new ideals in scientific farming, and new possibilities for rural education.

At the conclusion of the courses, Dr. Harrison, principal of the school, asked for an expression of preferences regarding subjects submitted for future sessions of the school. In a class of 44 the vote gave preference to the subjects named as follows: Botanical 26, entomological 10, ornithological 35, geological 35, genetics 37, bacteriological 29, ornamental gardening 5, manual training 15.

ONTARIO

THE annual school for rural leadership lasting ten days concluded at the Ontario Agricultural College on August 4th. The school was directed by Professor A. Maclaren of the college. About 130 students attended, consisting largely of ministers of rural Protestant churches. The course included lectures on social service, care of

mental defectives, boys' work, and other subjects bearing upon the social conditions of rural communities. A resolution was passed urging the re-establishment at the Agricultural College of the Department of Rural Sociology, which was discontinued when Professor Maclaren went overseas as an instructor among the soldiers.

MANITOBA

THE sixth annual Summer School for Rural Leadership was held at the Manitoba Agricultural College, July 15th to 31st. The scope of the school was enlarged this year by forming an executive composed of representatives from the Agricultural College, The Manitoba, Wesley and St. John's Colleges, the Young Men's Christian Association and Young Women's Christian Association. About ninety students attended. The morning sessions were devoted to a discussion

of more or less general topics. Rural sociology and religious education occupied prominent places in the programme of study. In the afternoon the school divided into sections for Young Men's Christian Association workers, for Young Women's Christian Association workers, for engineering, and nature study. Representatives were present from Port Arthur in the east to Lethbridge in the west, and from cities and towns between.

A modern and fully-equipped community establishment will be the social, intellectual, religious, recreational, and supply centre for the people. Industrially it will include a co-operative laundry and bakery and abattoir, where with a minimum of expense and of labour the needs of the community in these respects may be provided for. Educationally it will be a school in which the children will be introduced to the rich possibilities of rural life and encouraged to prepare themselves to make the most of them. Socially it will be the people's common meeting-place. They will often come together to enjoy each other's company, to eat and drink together, to discuss common interests, to plan co-operative activities, to enjoy music and oratory and drama, to participate in athletic sports and intellectual contests, to ponder the great problems of the state and the world, of morality and great hereafter, and to offer their common homage to God.

A Community Aspiration.

NOVA SCOTIA

REVIEW OF RURAL SCIENCE WORK FOR 1920

L. A. DEWOLFE, B.A., M.SC., DIRECTOR, RURAL SCIENCE SCHOOLS

THE year 1920 has been a good year in rural science work.

The chief expenditure, of course, was in connection with the regular year's work in the Normal College, Truro, and the Summer Science Training School. Salaries and travelling expenses in connection with these items constitute a heavy draft upon our funds. Aside from this the next biggest expenditure was for the employment of travelling teachers. Seven of these teachers were employed throughout the year and three others for a part of the year. We were enabled to engage these teachers because of a surplus of funds that had accumulated during two or three years of somewhat economical management. Now, however, this surplus is exhausted and we are forced to dispense with the services of these special teachers. This is indeed regrettable for their work was valuable and popular.

Each of these teachers went into about a dozen rural schools within a radius of a few miles. They taught work related to agriculture and home-making. Sometimes this work *could not* be done by the local teacher and in practically every case it *would not* be done. Regular teachers are wedded to a system of "passing" students. As the so-called rural science subjects are not necessary to a "pass", they are likely to be neglected. To avoid this neglect the travelling teacher was put in the field.

Another important feature of our work is the school exhibition. From small beginnings we have grown until last year 450 schools exhibited the produce of their field and hand work. A small amount of money was spent in prize-lists but these exhibitions have become practically self-sustaining. Each year we try

to improve our prize-list, until now we have a list which associates very well the ordinary school subjects with outside work. For example, the writing and drawing are based entirely upon the children's home work and experience. The greatest departure this year in connection with exhibitions was the introduction of sports on a comparatively large scale. Not only such commonplace athletics as races and tugs-of-war, but such educative features as a school parade, judging contests, and public-speaking contests were quite generally indulged in. This proved to be a popular feature with both adults and children.

Realizing that rural science or *the science of rural living* relates to the home fully as much as to the field, considerable attention has been given to the home-making subjects. Sewing, cooking, sanitation, household decoration.—in fact, everything that will make a house a home is included in our rural science extension work. Not only have the travelling teachers helped with this, but all the teachers in the regular Normal College classes get instruction along these lines. In our drive for better schools, better health has been one of our slogans. The Nova Scotia Department of Public Health has assisted us very much with its literature and demonstrations. The attractive feature of this sort of instruction is that it does not call for extra money.

The community centre idea has received a prominent place in our training system. The Normal College course is now much strengthened by having what may be called a Rural Life Department. The Rural Science Department has in a way developed into this newer conception of its opportunities. Above all the Summer Science Training School keeps

the needs of the rural community uppermost at all times. The social side of life is there exemplified to the fullest. During the summer session just closed regular science subjects were taught during the day, sports and athletics were indulged in during the late afternoon and each evening was given over to social gatherings. Our Summer School was really a model community centre. Each teacher who went out from us this year has gone out better equipped than have members of any previous class for taking their place as community leaders.

The addition of a moving picture equipment has facilitated our work very much. During the summer we were able to show educational films on an average of two evenings a week. This always gave a pleasant ending to the evening's programme.

Aside from the moving picture machine the chief addition to our equipment was the nucleus of a rural life library. Not only have we added a fairly representative collection of rural life books, but we have secured a great many pamphlets

and leaflets on rural play, community centre activities and similar topics.

It would not be fitting to close this brief account without referring to the splendid work done by Miss Baker. She has been the moving spirit in all our social efforts and particularly in the work along the line of playground methods. She obtained leave of absence during the month of June to study rural life methods under Dr. Harold T. Foght of the Normal and Industrial School, Aberdeen, South Dakota. Dr. Foght is a recognized leader in rural life problems and Miss Baker was able to bring back a number of good ideas and a degree of enthusiasm which made her work this year even more effective than it had been before—even though the quality of her leadership has always been worthy of recognition.

The outlook for our work continues hopeful. As in all other departments the crying need is more money. We need more money to continue such extension work as was done by the travelling teachers. Until such funds can be found somewhere our work will never be the success that it could otherwise be.

CHANGES IN COURSES AT THE AGRICULTURAL COLLEGE

BEGINNING with November of this year, two regular courses will be offered at the Nova Scotia College of Agriculture. The first will be very similar to the one heretofore given, except that practical training will receive more time, while there will be less of the more purely scientific studies. This course will extend over two years, and will be known as the Farmer's Course. All boys and young men who have had a reasonable amount of farm experience will be admitted, irrespective of school standing.

The other will be known as the Four Years' Course, although, for the present at least, only the first two years will be given at Truro. The remaining two years may be taken at any Canadian or American agricultural college which offers a four years' course leading to the B.S.A. degree. This course will require more of the purely scientific studies, and only those who have university matriculation standing in general education will be admitted to it. This arrangement of courses is being put in force at Guelph and Macdonald Colleges this year.

SILAGE CROPS

THE importance of growing a silage crop on the dairy farm is being more and more strongly impressed by feed conditions in recent years. Three different kinds are being grown at the College Farm this year, the O.P.V. mixture, (oats, peas and vetches) corn, and sunflower. All three promise a fine

yield. Corn is better than for some years past. In bulk, the sunflower crop greatly exceeds the other. It is a new crop at the College, although it has been grown in small quantities by a farmer here and there in the province. Tests of the comparative food value of these three will be made during the winter, and reports of results should be interesting.

NEW BRUNSWICK

BONUSING CLOVER HULLERS

E. P. BRADT, B.S.A., SECRETARY FOR AGRICULTURE

A FEW years ago the New Brunswick Department of Agriculture purchased a clover huller to be used for demonstration purposes in the province. This was the first huller introduced and has been the means of demonstrating that an excellent yield of high quality seed can be produced in the province. About 125,000 pounds of excellent clover seed was threshed by this outfit in the season just past. Previous to this practically all the clover seed used was imported. The great bulk of the seed is still imported. Our own supplies should by all means be grown within the province. The Department of Agriculture are taking steps to bring about this result.

The lime policy recently adopted by the department and which now makes it possible for farmers in any part of the province to get lime testing 94 per cent calcium carbonate delivered to them freight prepaid at \$5 per ton, is expected to make the growing of clover much more successful and also much more general throughout the province.

With the growing of the clover crop becoming more general and easy of attainment through the use of lime, special attention will be

given by the department to the promotion of the growing of clover seed. The government-owned huller can only do a limited amount of the necessary threshing in the province and it has been deemed advisable to encourage the purchase of hullers in the various counties of the province. The plan is to group the societies in the various counties and encourage the co-operative purchase of hullers through the Agricultural Societies by means of offering to bonus such outfits as may be approved.

Applications from Societies in three counties have already been received and many more are expected to avail themselves of this opportunity. Threshing facilities will thus be placed within reach of the farmers in every part of the province and clover seed growing will receive a decided impetus thereby.

The following regulations will govern the granting of the bonus by the Department of Agriculture.

I. Agricultural Societies desirous of securing a bonus on a clover huller should make application to the Department of Agriculture, Fredricton. The location of the outfit will be considered and if approved as being so located as to meet the needs of that particular county, approval will be given, and the Society notified that upon

the purchase of a satisfactory outfit a bonus will be granted.

II. After the arrival of the huller, an inspector from the Department will inspect the outfit and if satisfactory will recommend a bonus.

III. Not more than two hullers will be bonused in any one county. These must be so situated as to provide threshing facilities for the county.

IV. Societies must supply the original invoice from the firm from whom the purchase was made when making application for a bonus from the Department.

V. Societies may and are encouraged to use their regular government grants or any donations received, for the purpose of providing funds to purchase a clover huller.

VI. The Department bonus will be 25 per cent of the purchase price of the outfit as approved. The maximum bonus in any case shall not exceed \$500.

QUEBEC

AGRICULTURAL INSTRUCTION ACTIVITIES

FROM THE OFFICE OF THE AGRICULTURAL INSTRUCTION ACT

THE principal work under the provisions of the Agricultural Instruction Act, carried on by the Department of Agriculture of Quebec during April, May, and June of this year, was concerned with poultry, field crops, live stock, and horticulture.

POULTRY WORK

During the period under review nine travelling instructors were employed in teaching artificial incubation and brooding, and in supervising the work of the poultry stations. Fifteen poultry stations are being operated. Three stations have incubators with a capacity of 20,000 eggs, while those of the smaller stations average from 1,000 to 3,000 eggs. The hatchings ran from 52 to 95 per cent. The customs hatching system is being abandoned, and the day-old chick system substituted. After the distribution of chicks there is a follow-up system to see that proper methods of poultry rearing are adopted.

Eggs imported or purchased from large plants were not found to succeed so well as those supplied by local co-operative associations, and it is proposed in future to limit the importation of birds and eggs in order to avoid the introduction of

disease and the consequent lowering of vitality.

Eggs to the number of 25,000 were distributed to schools by the agricultural representatives and nearly 10,000 to the Women's Institutes.

PURE SEED AND CROP COMPETITIONS

Twelve Agricultural Associations have organized pure seed competitions. One county has forty competitors, each growing three acres of registered banner oats. Two inspections are made, one of the standing crops and the other after the grain is threshed.

The standing crop competitions are being held as usual and increased interest is being shown.

The department distributed 500 bushels of registered seed grain on special terms to the farmers of one locality last spring in order to increase the production of seed of high quality. The growing crops will be inspected and the seed sold through the Seed Growers' co-operative Association.

DEMONSTRATION PLOTS

Demonstration plots in various farm crops to the number of 98 were established in all parts of the

province in order to demonstrate improved methods of farming. They vary in size from one to three acres. Seeds and fertilizers are supplied free and operations are supervised by the Department.

BUILDING PLANS

The Quebec Department of Agriculture supplies plans of farm buildings to those applying for same. Its experts give advice on the spot on ventilation, water supply and similar subjects. Fifty plans were prepared and fifty-six farms visited during the three months.

FIBRE FLAX PRODUCTION

The Agronomy Division of the Department reports numerous inquiries as to the opportunities for flax growing. A company has recently established a plant in Rouville county and has contracted for one hundred and fifteen acres of flax. Many sections of the province are regarded as particularly well adapted to the production of high class fibre.

MAPLE SUGAR

Six instructors in sugar-making were employed during the spring campaign who conducted eighty-one demonstrations attended by three thousand persons in twenty counties of the province. The sugar school at Ste. Louise averaged five or six pupils per week during the season. Visitors to the number of four hundred and seventy-five were received at the school.

LIVE STOCK

A summary of the three months' activities under this head is as follows:

	Num-ber.	Attend-ance.
Lectures on breeding.....	25	2,400
Sheep demonstrations (shearing, docking, etc.)	20	450
Sheep dipping demon- strations.....	10	600
Inspection of cattle, sheep and swine and advice to owners.....	150	.....
Assistance to farmers for the purchase of breeding stock.....	24	.....

HORTICULTURE

This season, demonstration fields are being operated as follows: Fruits 95; potatoes 42; tobacco 10.

The spring distribution of fruit trees to Horticultural Society members numbered 17,425. Strawberry plants of the "Senator Dunlap" variety to the number of 250,000 were procured and sold to growers chiefly in the vicinity of Montreal and Quebec.

The demonstration apple orchards promise a light crop owing to the ravages of the apple budworm.

Sixty-one demonstration stations for small fruits are being operated. It is the intention to make these plots a centre of propaganda and a distribution point for strawberries, etc., in their respective districts.

Ten tobacco demonstration fields were established this year for the first time. The plots are of one acre each, and variety tests are to be conducted under the supervision of the Department. The tests will continue for five years.

The potato demonstration fields number forty-two this season, chiefly in three counties. For each of the plots, seed was supplied for planting one acre, as well as chemicals, spray pumps, and fertilizers. Four provincial officers are being trained in potato inspection work by the Dominion Department of Agriculture.

SCHOOL AND HOME GARDENS

The spring distribution of seed to school children was 140,000 packages.

The large increase in the applications for potatoes for school gardens made it impossible to supply all applicants.

ONTARIO

EXPERIMENTS IN AUTUMN SOWN CROPS

BY DR. C. A. ZAVITZ AND PROFESSOR W. J. SQUIRRELL, ONTARIO AGRICULTURAL COLLEGE

IN the past year forty-six varieties of winter wheat, including twenty-four hybrids and a number of straight selections were tested on the trial grounds at the Ontario Agricultural College. Of the named varieties, fourteen have been grown in each of twenty-five years.

The following table shows the average weight per measured bushel of these fourteen varieties for twenty-four years, the yield of grain per acre for 1920 and the average yield of both straw and grain per acre for the twenty-five year period.

Variety	Colour of Grain	Pounds per Measured Bushel 24 years	Yield per acre		
			Bushels Grain 1920	Average 25 years.	
				Tons Straw	Bushels Grain
Dawson's Golden Chaff.....	White.....	59.7	43.1	2.7	40.0
Imperial Amber.....	Red.....	61.0	44.0	3.1	47.0
Early Genesee Giant.....	White.....	60.0	46.3	2.9	45.5
Egyptian Amber.....	Red.....	61.3	41.6	3.0	45.0
Early Red Clawson.....	Red.....	58.9	45.2	2.7	45.0
Rudy.....	Red.....	61.1	31.8	2.7	43.8
Tasmania Red.....	Red.....	61.6	43.4	2.8	43.7
Tuscan Island.....	Red.....	61.1	38.9	2.8	43.3
McPherson.....	Red.....	61.6	46.5	2.5	42.7
Turkey Red.....	Red.....	61.4	40.6	2.7	42.6
Kentucky Giant.....	Red.....	60.8	39.4	2.6	42.3
Bulgarian.....	White.....	60.6	44.6	2.7	41.8
Treadwell.....	White.....	59.7	38.4	2.7	40.8
Geneva.....	Red.....	61.7	41.0	2.9	42.4

The average results of these fourteen varieties for the whole period are as follows: Yield of grain per acre 43.9 bushels; yield of straw per acre, 2.8 tons; and weight per measured bushel 60.8 pounds. The results for 1920 were 3 per cent less in yield of grain per acre, 29 per cent less in yield of straw per acre, and 2 per cent greater in weight per measured bushel than the average results for the whole period. In fifteen years of the twenty-five year

period, the yields of grain per acre surpassed those of 1920. In only nine years of the twenty-five year period were the weights per measured bushel greater than those of 1920. In 1920, of the forty-six named varieties under test, the highest yields of grain per acre were produced by the Kanred, O.A.C. No. 104, Minnesota No. 150, Klondike, and American Banner. In each of twelve years the varieties of winter wheat grown under

experiment were carefully tested for bread production. Those varieties which produced the largest loaves of bread from equal quantities of flour in the average tests made are given in order as follows:—Yaroslaf, Banatka, Buda Pesth, Tuscan Island, Crimean Red, Egyptian Amber, Tasmania Red, Kentucky Giant, Rudy, Treadwell, Turkey Red, and Bulgarian; and those which produced the smallest loaves of bread are the Abundance and the Early Red Clawson. In average bread production for five years of each of thirty varieties, the largest loaves were produced by Buda Pesth, Yaroslaf, Turkey Red, Kentucky Giant, Theiss, and Treadwell; and the smallest loaves by Early Red Clawson, Grant Prize and Wrinch's Volunteer.

A NEW VARIETY

With the object of originating better varieties than those already in cultivation, crosses have been made between the Dawson's Golden Chaff and some of the varieties of particularly high quality for bread production, such as Tasmania Red, Crimean Red, Turkey Red, Buda Pesth, Bulgarian and Imperial Amber. A cross made between the Dawson's Golden Chaff and the Bulgarian has furnished a new variety which in six years has surpassed both its parents in average yield per acre and is nearly equal to the Bulgarian in bread production. This variety has been given the name, O. A.C. No. 104, and is a most promising variety. It is a white wheat with a white chaff similar to the Bulgarian and a beardless head similar to the Dawson's Golden Chaff. It is more vigorous in growth and kills out less in the winter than either of its parents.

Winter wheat which has been grown on clover sod has yielded better than that which has been grown on timothy sod.

In the average of eight separate tests, land on which field peas were used as a green manure yielded 6.5 bushels of wheat per acre more than land on which buckwheat was used as a green manure.

WINTER RYE

In each of the past seventeen years, four varieties of winter rye have been under experiment at the college. The following average results in yield of grain per acre and in weight per measured bushel have been obtained: Mammoth White 55.9 bushels, 57.2 pounds; Washington, 53.8 bushels, 57.2 pounds; Common 52.8 bushels, 57.3 pounds; Thousand Fold 52.5 bushels, 57.0 pounds. For nine years in succession the Petkus variety has been grown in competition with the four varieties here referred to and during this period surpassed the Mammoth White in yield of grain per acre in seven of the nine years and by an average of 4.2 bushels per acre. Winter rye is hardier than winter wheat and will stand later seeding in the autumn.

Four hundred and seventy-two farmers situated in almost every township in Ontario conducted experiments with autumn sown crops during the past year. There were in all six distinct experiments. Owing to shortage of help on the farms and to lateness of season, the reports have not all been received. The complete summary will be deferred until the annual meeting of the Experimental Union, which will be held in January next.

MOTOR TRANSPORTATION IN RURAL ONTARIO

AT the conclusion of a survey and study of motor trucking in the Province of Ontario, Messrs Donald R. Cowan, and F. C. Hart have reached the following conclusions:—

In summing up the information gained in this inquiry, we realize the absolute necessity of conducting a careful survey by any operator or group of farmers desiring to start a motor route in any particular locality. Inquiries should therefore be made in the following directions:

(1) The county agricultural representative, with his intimate knowledge of local conditions, should be able to give an unbiased opinion.

(2) The local banker, in close touch with conditions in his district is a helpful source of information.

(3) The local merchants know the transportation needs of their communities. These merchants, together with local industrial plants, and city dealers with rural clienteles, make profitable customers, as their freight usually bears a higher rate than farm products. Few farming districts can support a motor route with tonnage of farm products only. The amount of commodity freight available between towns and villages and cities should be estimated.

(4) The farm shippers should be interviewed in order to estimate the amount of tonnage moving from the district, and available for a truck.

The conditions to be inquired into include:

(1) The times of shipment of the tonnage available. The ideal territory is one in which the products move to market in a fairly steady stream throughout the year, such as in a dairy or truck farming district.

(2) The character of the tonnage. Low priced, light or bulky staples (such as hay) will not usually bear

the motor truck rate. In general, loads which have a high value per unit of weight or size offer the most profitable return.

(3) The possibility of obtaining return loads.

(4) The roads. In connection with the roads it is necessary to know what territories they serve and where they connect; whether paved, the kind of pavement, and its condition in wet and dry weather; the grades; the traffic conditions at different hours on different days of the week and at different seasons of the year. (Much freight is moved over the Toronto-Hamilton highway at night to avoid congestion of traffic during the day.)

(5) The existing transportation facilities. The prospective operator should pay special attention to the schedules, collection and delivery arrangements, and rates, of existing carriers, and determine whether the motor can make marketing more direct, can move perishable products more speedily, or can offer a more complete pick-up and delivery service at competitive rates.

Since rural motor express is developing rapidly, failures should be avoided by acquiring an accurate knowledge of conditions and using good judgment in forecasting business prospects.

It has often been maintained that the average farm is already over-capitalized with machinery. The purchase of trucks by individual general farmers would accentuate this condition, as the truck like other machinery would be used but a small portion of the year. The co-operative ownership of a truck, by which the trucking of a number of farms may be combined, would therefore be more advantageous and might prove to be the means of overcoming the transportation difficulties of the district.

CULLING POULTRY FLOCKS

BY W. R. GRAHAM, B.S.A., PROFESSOR OF POULTRY HUSBANDRY

THE poultry culling work carried on this year by the Poultry Division of the Ontario Agricultural College is to cull the breeding station flocks, and incidentally give culling demonstrations where agricultural representatives are able to make satisfactory arrangements. In addition to this we have had two men culling flocks in Lanark County for two weeks. They handled during that time about 4,500 hens, of which more than 1,100 were culled out as inferior birds. We also assisted in some culling work in Oxford County arranged for by Mr. G. R. Green, the agricultural representative. All the farmers in one township who desired it could have their flocks culled. Work was done by local men. A charge of three cents per

bird was made which was sufficient to pay the wages of the cullers who receive fifty cents an hour for their time. I made it my duty to train the men and to supervise the work, more especially to see that no really good birds were shipped out.

The work which was entirely organized by Mr. Green included the culling of 116 flocks, made up of 7,187 hens. Of this number about fifty per cent, or 3,855, were considered good enough to keep. Seven hundred and sixty-eight were regarded as of medium quality to be retained to the end of the present laying period, and then disposed of. Two thousand five hundred and sixty-four were shipped out as culls. Practically all of the culled hens were shipped out in a live stock car.

REGULAR COURSE AT KEMPTVILLE AGRICULTURAL SCHOOL

BY W. BERT ROADHOUSE, DEPUTY MINISTER OF AGRICULTURE

CALENDARS have been issued announcing the opening of the first regular course at the Kemptville Agricultural School on October 25th. A considerable number of applications have already been received and it is anticipated that there will be a good class for the first year of this new institution.

With the opening of the course near at hand, Honorable Manning Doherty Minister of Agriculture, has recently made appointments to the staff, which is being organized by the Principal, Mr. W. J. Bell, who has been in charge of the work since the farm was purchased a few years ago. The appointments which have just been made are E. K. Hampson as Instructor in Field Husbandry, Soil Physics, Agricultural Chemistry and Bacteriology, and L. Heimpel as Instructor in Farm Engineering and

Drainage. Both these men are graduates of the Ontario Agricultural College. Mr. Hampson since graduating has been agricultural representative in Welland County and Durham County, serving in the latter county during the past year or more. Mr. Heimpel was on the drainage staff of the Department for a time but for the past year has been farm foreman at the Ontario Agricultural College. He has been particularly successful in instruction work in farm mechanics and drainage, and in addition to his work at the Kemptville School he will devote attention to drainage matters in the eastern section of the province rendering assistance to the farmers wherever possible. Other instructors will no doubt be appointed later.

A new farm mechanics building is now under construction and with the other buildings which have already

been completed the school will be in good shape, both from the standpoint of staff and equipment, to handle students this fall. The farm is also well supplied with live stock, having

a dairy herd which has already made some fine records. The proposed course will be as practical as it can possibly be made and will be a two-year course.

APPOINTMENTS

IN accordance with plans foreshadowed during the session, Honorable Manning Doherty, Minister of Agriculture, has made some changes in the administration of the Agricultural Representatives Branch of the Department. The title of Mr. R. S. Duncan has been changed from Supervisor to Director and he will have general charge of the administrative work in connection with this branch of the service.

W. D. Jackson, B.S.A., has been appointed Assistant Director and his duties will include keeping in direct personal touch with the men in the field, supervising methods and assisting in planning special work to meet special conditions in different parts of the province. It is felt that the work has suffered somewhat for lack of direct supervision of this nature and it is anticipated that

having a man in the field constantly in touch with the work of all offices will bring about higher efficiency of service and greater usefulness to the farmers of the province. Aside from good ability and personality Mr. Jackson has had a long experience which well fits him for his new duties. He has been an agricultural representative in Carleton County for upwards of ten years and has for some years past acted as secretary and manager of the Ottawa Winter Fair.

D. J. Matheson, B.S.A., has been appointed agricultural representative at Carp for Carleton County in succession to Mr. Jackson. Mr. Matheson is a recent graduate of the Ontario Agricultural College and has had experience in agricultural representative work but has lately been on the staff of the United Farmers of Ontario.

MANITOBA

SUNFLOWER ENSILAGE FOR MILK PRODUCTION

AN experiment has been carried on by the Animal Husbandry Department of the Manitoba Agricultural College to determine the feeding value of ensilage made from the sunflower as compared with similar feed made from corn. The experiment was carried on with cows giving milk and was directed to compare the yield from these two kinds of feed. The feeding trial which was carried on with seven cows was conducted from December 19th, 1919, to April 1st, 1920. The basal ration consisted of alfalfa, mixed clover, and timothy

hay and a meal mixture of oats $6\frac{2}{3}$ parts, barley $1\frac{2}{3}$ parts, bran 5 parts, and oilcake meal $1\frac{2}{3}$ parts. The trial was divided into three periods. During the preparatory period lasting one week, corn ensilage and the basal grain ration was followed by a four weeks' feeding period, during which records were kept of feed consumed, milk produced, and weights of cows as taken at the end of each week. In the second period, corn silage was replaced by sunflower silage after a preparatory feeding period of one week. In the third period, corn

silage was given in place of sunflower feed. An average was then struck between the results of periods Nos. 1 and 3 in order to overcome the disturbing factor of decreased milk yield through advanced lactation.

Both silage crops were cut and put into different silos at the same time. The corn was well cobbled and the silage dry and well flavoured and of high feeding value. The sunflowers, which mature well anywhere in Manitoba, were in the milk stage at the time of cutting. The sunflower silage, like the corn silage, was of pleasing flavour and quite free from mould. An analysis of the two feeds showed that sunflower silage contained fully 16 per cent more moisture than the corn. The sunflower silage was slightly lower in nutritive value. The average daily ration given was 40 lbs. of silage, 16 lbs. of hay, and 12 to 16 lbs. of meal mixture. In point of palatability there was little to choose between the two kinds of silage. Sunflower silage was readily eaten at all times and apparently relished. With regard to the general effect of the two feeds on the system of the animals, it was agreed that the advantage was decidedly in favour of sunflower silage. During period No. 2 it was observed that the cows improved in handling qualities, the hair became softer to the touch and the skin more pliable, indicating more abundant secretion.

CONCLUSIONS

While it is realized that definite conclusions cannot be drawn from the results of one feeding trial, that in order to determine the actual feeding value of sunflower as compared with corn silage, the work must be repeated several times and with different groups; nevertheless sufficient information has been gathered to warrant the following conclusions:

1. Sunflower, when mature enough to the extent of the seeds being formed at the time of cutting, makes a very succulent, palatable, and nutritious silage.

2. By reason of the excessive moisture which sunflower ensilage contains, it freezes to a greater extent than corn in the silo, which would probably be a decided disadvantage where out door feeding is practised.

3. By reason, again, of its extreme succulence, sunflower packs more thoroughly in the silo and is, therefore, less liable to contain pockets of mould than is corn silage.

4. Dairy cows maintain their milk flow and body weight at least equally as well on sunflower silage as on corn silage.

5. In view of the difficulty of growing corn to maturity in some parts of Manitoba and whereas sunflowers can generally be matured and will withstand more frost it would seem to be a good policy to raise sunflowers for ensilage in localities affected by the above considerations.

MR. G. J. H. MALCOLM, MINISTER OF AGRICULTURE

As this number of The Agricultural Gazette is going to press the announcement has been received of the appointment of Mr. G. J. H. Malcolm, M.L.A. for Birtle, as Minister of Agriculture for the Province of Manitoba to succeed the late Honourable Valentine Winkler. The Honourable Mr. Malcolm is a graduate of the Ontario Agricultural College. He has been a member of the provincial house continuously since 1910 and has for several years been chairman of the Agricultural Committee of the Legislature.

SASKATCHEWAN

THE BETTER FARMING TRAIN

A BETTER farm train equipped and operated by the College of Agriculture, the Saskatchewan Departments of Agriculture and Education, and the Canadian Pacific Railway Co. made a five weeks' tour through the central part of the province. The expenses of the train were financed by funds provided under *The Agricultural Instruction Act*. The train consisted of thirteen cars equipped with sections

representing Live Stock, Field Husbandry, Farm Mechanics, Poultry, Household Science, and Boys' and Girls' work. Stops were made at two points each day. The programme was uniform throughout the tour. The purpose of the train was mainly to bring to the attention of farmers the instruction and other services placed at their disposal by the College of Agriculture.

DAIRYING IN SASKATCHEWAN,

BY W. A. MACLEOD, EDITOR OF PUBLICATIONS

IN his annual report of the Dairy Branch, the Commissioner, Mr. P. E. Reed, states that the progress of dairying in Saskatchewan, for the twelve months ending April 30, 1920, was thoroughly satisfactory, in spite of the fact that the year was not at all a favourable one as more than a full share of adverse circumstances was encountered.

Two new features in connection with the year's creamery butter trade are: A marked increase in the demand for sweet (unsalted) butter, and a keen demand from United States points for Saskatchewan butter. More than a quarter million pounds of unsalted, or as it is usually called in the trade, "sweet" butter, were manufactured in the province during 1919, one creamery shipping practically its entire output east in this form.

VALUE OF SASKATCHEWAN'S DAIRY PRODUCTION

Complete figures of the production and consumption of dairy products within the provinces are obviously

not obtainable. In the following table is given a careful estimate of the value of the total production.

DAIRY PRODUCTION, 1919

Milk consumed in province, (estimated): 32,880,477 gals. at 25c., \$8,220,119.25.

Whole milk fed to calves, (estimated): 7,286,720 gals. at 25c., \$1,821,680.00.

Creamery butter, actual figures, 42 creameries: 6,622,572 lbs. at 52.92c., \$3,504,665.10.

Dairy butter (estimated): 21,552,135 lbs. at 41c., \$8,836,375.35.

Cheese, actual figures, 1 factory: 35,452 lbs. at 32.51c., \$11,527.00.

Ice cream, actual figures, reported by 7 manufacturers: 483,740 gals. at \$1.19, \$579,661.81.

Ice cream 29 listed manufacturers not submitting detailed reports (estimated): 58,000 gals. at \$1.19, \$69,020.00.

Total, \$23,043,048.51.

The new Dairy Products Act passed at the 1919-20 session of the Saskatchewan legislature (reviewed in the June number of *THE AGRICULTURAL GAZETTE*), came into force on May 1st, 1920, and is calculated to improve conditions of production and manufacture and to further standardize the manufactured product.

GREATER AVERAGE PRODUCTION COMPETITION

THE Dairy Branch of the Saskatchewan Department of Agriculture, in conjunction with the Dairy Association, is conducting for the third year a Greater Average Production Competition. Eight cash prizes grading from \$175 to \$5 were provided. These awards will be made available to owners or proprietors of herds of five or more cows on the basis of the average butter fat production of whole herds for the twelve months ending December 31st, 1920. To be eligible

for a prize in this competition competitors must keep a record, for at least six months of the year, of the production of their herd in conformity with the rules laid down in the system in use by the Dairy Division, Ottawa, viz.: they must weigh the milk of each individual cow three days each month for at least six months and have each cow's milk tested for butter fat content once each month as required by the testing regulations above mentioned.

MARKETING EGGS IMPROVING

M^{R.} J. F. Booth, Commissioner of Co-operation and Markets reports a marked reduction in the percentage of bad eggs received by wholesale companies within the province in recent shipments as compared with the same season in former years. The improvement is credited to the operation of the Egg Marketing Act, which came into force in the beginning of June this year. To meet the standards called for, it is necessary to candle all the eggs as received from producers. Two thousand retail egg merchants in

the province are licensed by the Co-operation and Markets Branch. Two inspectors are visiting these merchants giving them personal assistance with respect to the egg trade. Later in the season inspectors will make a second tour to enforce the Act. Bulletins are sent out with licenses explaining the candling of eggs, and the construction of a simple candling device. These various forms of assistance are clearing away much of the early misapprehensions that were evident when the Act was first made public.

THE MONTHLY BANK BULLETIN

AS a means of keeping the farmers and others interested in the live stock industry informed of the activities of the Live Stock Branch, a monthly bulletin designated the Monthly Bank Bulletin is distributed. Bulletin number eleven, of this series for example, announced the sale of pure bred stock fixed to be held at Saskatoon, by the Saskatchewan Cattle Breeders'

Association. This bulletin is distributed throughout the province, in much the same fashion as other bulletins, except that postage is paid on it, whereas purely educative bulletins do not require to pay postage. The bulletin is sent to banks, secretary-treasurers of municipalities, secretaries of agricultural societies, postmasters, members of the various live stock associations, and others who desire to receive it.

SALE OF LIVE STOCK BY THE DEPARTMENT OF AGRICULTURE

WITH a view to assist the farmers in Saskatchewan to increase and improve their live stock, provision is made by the government of Saskatchewan for supplying bona fide farmers, desirous of obtaining foundation breeding stock, with animals of good quality at first cost. This work is carried on under the Live Stock Purchase and Sale Act, which provides in its regulations eight options whereby animals may be secured under certain conditions on a cash basis, or on part credit. In order to receive stock under any of the credit option provisions an applicant must be actively engaged in farming, and be

- (a) a member of a grain growers' association; or
- (b) a member of an agricultural society; or
- (c) a shareholder or patron of a creamery operated by the Saskatchewan Co-operative Creameries, Limited; or
- (d) a shareholder of a live stock improvement or marketing association organized and incorporated under The Agricultural Co-operative Association Act, or;
- (e) an ex-soldier recommended by the secretary of the Returned Soldiers' Employment Commission of Saskatchewan.

ALBERTA

CROP IMPROVEMENT ASSOCIATION ORGANIZED

BY G. H. CUTLER, B.S.A.,* PROFESSOR OF FIELD HUSBANDRY, UNIVERSITY OF ALBERTA

DURING the past three years the Department of Field Husbandry, of the University of Alberta has been putting forth every effort to standardize and purify old varieties and breed up new ones of the different farm crops. During that time there has been an insistent and steady demand for pure seed representing suitable varieties, and for information as to how registered seed can be obtained or produced. In answer to these applications for seed, samples in nearly every case have been sent out, and many have been forwarded upon oral request. The size of the samples has varied from a few ounces for testing to three bushels or more for multiplication. During the past two seasons over fifteen hundred samples of seeds were placed in the hands of interested seed growers who are undertaking to test and multiply given improved and purified strains of the different farm crops. We feel that this is the beginning of a very important movement in seed

production in Alberta, but if it is to attain its highest development, organization of a definite character seems imperative. For instance, after spending years of effort upon the improvement of a given strain of wheat, it is not enough that it be distributed promiscuously. On the contrary, a scheme must be developed whereby new strains and varieties can be distributed and multiplied expeditiously, so that they ultimately may reach the greatest number of growers, true to name and variety and in the highest possible state of purity.

In meeting adequately therefore, the needs of the farmers of Alberta, the University at Edmonton is prepared to co-ordinate all co-operative seed testing, seed distribution and multiplication work under one organization to be known as the "Alberta Crop Improvement Association", with headquarters at the University, under the administration of the Head of the Department of Field Husbandry.

By means of this organization the University through the Department of Field Husbandry, hopes to extend two important services to the farmers of the Province:—

1. The multiplication and ultimate distribution of high grade seed of approved strains and varieties of farm crops.

2. The co-operative testing and multiplication of new strains, new varieties and new hybrids produced by plant breeding and selection.

SEED CENTRES FOR MULTIPLICATION AND DISTRIBUTION

In carrying into effect these services the Department of Field Husbandry is organizing Seed Centres or Local Crop Improvement Associations at points suitably located throughout the province. The locations of centres are determined by the following factors:—

1. The suitability of the local conditions for the production of a high quality of clean seed of some one crop.

2. The efficiency of shipping facilities in order that large surpluses may be readily transported.

3. The attitude of the growers toward the principle of co-operative effort.

4. The possibility of obtaining at least five growers in each centre or local—exceptions will be made where it seems probable that sufficiently large amounts of seed will result at a relatively small cost to the University.

During the past winter, seven such centres were established and plans are laid to establish many more for which requests have been made, but owing to lack of suitable seed, these will not be established until this fall.

The plan of organization is as follows:—

1. Each centre or local must appoint a secretary-treasurer.

2. Seed of high standing is offered to each member of the group, the seed being either Elite or 1st Gen. Registered, representing a suitable variety or strain.

3. The seed is sold at a cash price—this year oats were sold at \$2.25 per bushel.

4. No charge will be made for seed sent out for co-operative testing.

5. Sufficient seed is sold to each member to seed a minimum of one acre. This quantity

enables the grower to get into seed growing extensively in a minimum of time.

6. The grower contracts to seed it on clean land, rogue it if necessary, and thresh it carefully.

7. The University on the other hand, agrees to inspect free of charge, the standing crop and threshed grain, according to the rules and standards of the Canadian Seed Growers' Association. This gives all resulting seed the same standing in other provinces of the Dominion as it has in Alberta, a point of supreme importance to the growers.

8. No inspection will be given to co-operative test plots.

9. All seed and standing crops will be inspected by competent inspectors.

10. The membership fee will be one dollar per annum. Inspection services will not be extended to those in arrears for membership.

11. Membership will be discontinued to those who do not conform to the rules of the Association.

CO-OPERATIVE TESTING OF NEW STRAINS

The Association also offers to its members new and untried strains or hybrids resulting from the systematic improvement of farm crops as carried out by the Department of Field Husbandry at the University. In view of the fact that wheat, oats, barley, winter rye, peas, corn, alfalfa, clovers, timothy, and western rye are undergoing improvement, the prospects are very bright for immediate service to all members. In fact, already the following new strains are ready for wide distribution and testing:—

One strain of peas (Alberly Blue).

One strain of red clover (Altaswede

One strain of sweet corn (Howes Early Bantam)

In the very near future new strains of wheat, oats, and barley will be available. As new strains and hybrids are developed they will immediately be made available to the members of the Provincial Crop Improvement Association.

The advantages accruing from such an organization are as follows:

Farmers will be put in immediate and constant touch with the best

varieties of grain and fodder crops for this province as they now exist, and as new ones are developed.

Farmers will be given a chance to help standardize the crops of Alberta and to participate in the benefits therefrom. They will also be given a chance to help make this province more productive; to help make its farm lands noted for their ability to produce uniform, high yielding, standardized varieties of the types best suited to its soils and climatic conditions, and to help meet the demands of an ever-increasing seed market at home, to the east, west, and south. The Association will tend to unify the efforts of those interested in the

production of bigger and better crops; it will tend to place seed growing on a stable basis and ensure large supplies of reliable seed of approved varieties and strains of all farm crops, and through various agencies of advertising, bring to the attention of the farmers of America the possibilities in crop and seed production in Alberta.

And finally, the university will be enabled most effectively, to place new and improved strains and varieties of all farm crops that can be grown by scientific breeding and selection, at the disposal of the constituency it is endeavouring to serve.

BRITISH COLUMBIA

AGRICULTURAL LEGISLATION

THE following is a brief review of the legislation relating to agriculture passed at the last session of the Legislature of the Province of British Columbia.

Domestic Animals Conservation Act. By this Act any member of the Executive Council of British Columbia may cause domestic animals, abandoned or neglected by their owner, to be taken possession of and properly cared for and fed. To obtain repossession the owner must pay all expenses incurred, otherwise the animals are sold at public auction. The domestic animals referred to by the Act are horses, cattle, sheep, swine, and goats.

Co-operative Associations Act.—Under this Act any five or more persons may form an incorporated association for the purpose of carrying on any lawful business, trade or industry other than the construction and operation of railways, the business of banking or insurance or of a trust company. Every such association must include in its name the word "co-operative" also one of the words: "association", "society", "union", or "exchange", but not the word "company", or the word "limited". In

the case of an association dealing with agricultural products no member shall be entitled to vote at any general meeting or be appointed a director of the association unless he has sold his main crop or produce of the year through the association, or undertakes in writing to do so during the ensuing year, or has received consent of the directors to dispose of his crop or produce otherwise.

A member may hold any number of shares in the association. Dividends up to 8 per cent per annum may be paid, and the remaining profits distributed among the patrons of the association whether members or not and whether vendors or purchasers. The liability of a member is limited to the amount unpaid on the shares held by him.

Creameries and Dairies Regulation Act.—This Act repeals the Milk Fraud Act, 1911, and the Dairy Regulation Act, 1916. Under it, in order to operate a creamery or dairy, a license must be obtained from the Minister of Agriculture of the province. Milk testers must also be licensed. Records of all weights and tests of milk and cream supplied must be kept.

Provincial dairy inspectors are to visit all creameries and dairies as frequently as possible to inspect the premises and to render the persons in charge assistance with regard to the making and marketing of their products. If an inspector finds the cattle, stable, or premises of any dairy in an unfit condition he may prohibit the owner from selling the product of the dairy. The manager of a dairy may inspect the premises of any farmer from whom he purchases milk or cream.

The government may make regulations prescribing the testing apparatus to be used, and the standards and methods of grading milk.

Animals Act Amendment.—Section 3 is repealed and a new section substituted under which no person may allow any bull or stallion over one year or swine over six months to run at large. Except that the Lieutenant-Governor-in-Council may by proclamation define any area in a district in which bulls of a good beef type or stallions may be allowed to run at large at certain times.

Contagious Diseases (Animals) Act Amendment.—Two new sections, 23A. and 23B, are added. Every person other than an inspector who applies the tuberculin test to any animal must send a report to the Minister of Agriculture describing the animal and stating the result of the test. The owner of an animal which reacts to the test must quarantine it, and may dispose of it only under instructions from an inspector.

Apiaries Act Amendment.—Persons keeping bees, on applying for a certificate of registration, must now furnish a statement of the number of colonies in their possession.

Drainage, Dyking and Development Act Amendment.—The Sections of the 1913 Act, covering petitions for the appointment of Commissioners to execute and maintain works, are

repealed. A new section 14A is added providing for the dissolution of the Commissioners as a body corporate. The powers and duties of the Commissioners are defined at greater length especially as regards the levying of taxes. Provision is made for enlarging existing drainage, dyking, or irrigation districts.

Land Act Amendment.—By this amendment if a pre-emptor fails to make the improvements he is required to make, his pre-emption may be cancelled. It provides for cancellation of a pre-emption record when, after a three months' notice given by the Minister, the pre-emptor does not pay the monies due to the Crown and apply for the Crown grant.

Land Settlement and Development Act Amendment.—The purposes for which loans may be made to any person or association under the Act are now stated as: Any purpose which will maintain or increase agricultural or pastoral production; carrying out the objects of an association; taking over an existing loan advanced by the Crown to an association or any debentures issued by an association. When loans are advanced by instalments, the amount of the instalments must not at any time exceed the proportion which the improvements actually effected bear to the entire improvements undertaken.

Agricultural Act 1915 Amendment.—Part I. relating to loans for agricultural purposes is not amended. The sections in the 1915 Act relating to incorporation of associations with or without share capital and the sections concerning inspectors of creameries are repealed. New sections covering aid to farmers, and women's institutes, and associations holding government loans advanced under the repealed Part III of the 1915, Act are placed in the Act.

PART III

Junior Agriculture

DEMONSTRATIONS, COMPETITIONS, AND CLASS-ROOM STUDIES IN RURAL
LIFE FOR BOYS AND GIRLS

ONTARIO

BOYS' AND GIRLS' LIVE STOCK CLUB WORK

R. S. DUNCAN, B.S.A., DIRECTOR, AGRICULTURAL REPRESENTATIVES

THE Boys' and Girls' movement bids fair to rival school fair work as the most popular feature of agricultural extension work. Perhaps, this is due to the fact that boys and girls literally love animal pets—things that are alive and respond to care and kind treatment. Moreover, because they can call the calf, pig, or sheep their very own, and because some day they hope to sell their animal at a profit and spend the money as they wish, it sustains and animates their interest.

Wherever these live stock clubs have been organized the representatives have the active support and co-operation of the live stock men in the community. This augurs well for the future of Ontario's junior farmers. The boys are commencing early in life to get into the pure bred live stock business and it is confidently hoped that they will receive every encouragement from their parents and others.

The first live stock club for boys and girls came into being in the early months of last year. Counting those which were formed previous to the period covered by this report and those that were organized last year, there are 6 calf clubs, 10 pig clubs, 2 sheep clubs and 2 live stock clubs or a total of 20 boys' and girls' live stock clubs with a membership of 450. This is merely a small beginning but a number are now in the

process of formation and the work will soon spread to every county in the province.

In the purchasing of animals, arrangements are usually made with the local banks to advance the necessary funds on the security of a note from the boy or girl for a definite period at a fixed rate of interest. These notes must be endorsed to the satisfaction of the bank by their parents or guardians. As a rule nothing but pure-bred animals are purchased and these are registered in the name of the boy or girl owner. As a protection, the animals are insured until such time as the notes are paid at the bank.

REGULATIONS

The rules of the Essex County Duroc Jersey Pig Club, which are typical of many others organized, are given herewith:—

Conducted under the auspices of the Ontario Department of Agriculture, Essex County Branch and the Imperial Bank of Canada, Essex Branch:—

1. Any boy or girl who will agree to the conditions of the Club between the ages of 10 and 18 years, may become a member.

2. The objects of the Club shall be to create a greater interest in hog raising in Essex County, which is so well adapted to this industry. To give the members of the Club the latest information on feeding and caring for hogs, and to create more interest in farm work in general, and livestock in particular.

3. The Club will be organized by the agricultural representative for Essex County, and the money necessary will be advanced by the Imperial Bank, Essex.

4. Each member will receive two pigs, about two months old, one a registered Duroc Jersey gilt, and the other a grade. The pure-bred pig must be bred to a pure bred boar in the fall, and the grade pig sold to pay the loan on December 1st.

5. Each member must sign a note endorsed to the satisfaction of the manager of the bank for \$28, payable December 1st at 7 per cent interest. The pure bred gilt costs \$20, grade pig \$8, both being sold to members at cost.

6. The child's parents must agree to furnish a suitable pen and yard, and to supply the member with sufficient quantity of suitable feed, and also one-quarter acre for pasture.

7. Each member must care for the pig in person, and supply a balanced ration according to instructions given by Department of Agriculture.

8. Forms will be supplied to record the amount and kind of feed fed, and weight of each pig at end of each month.

9. The pigs will be distributed from Essex and each member and parent must be present to receive their pigs, and sign their note. The pigs will be numbered, and the numbers drawn from a hat, and each member must take the pigs drawn.

10. The pigs will be selected from well bred stock by competent judges, and the pure-bred will be registered in the members' name.

11. Each member will be visited from time to time, and given suggestions on care, and scored on condition of pigs.

12. Two competitions will be conducted, and generous prizes awarded. The basis of the awards will be:—

CLASS 1.—FEEDING AND CARE

(a)—50 points for highest net profit per cwt.

(b)—25 points for condition when visited in summer.

(c)—25 points for best kept records and report.

In this competition, the hogs will be valued at a uniform prevailing market price, and market prices will be used in calculating cost of feed.

CLASS 2.—EXHIBITION

Duroc Jersey Gilt Exhibited at Essex Fair.

13. The Club will be limited to the first fifty suitable applicants on the enclosed application blank.

The representative states in his annual report:—

"The exhibit of pig club gilts at the Essex Fair demanded a great deal of attention and commendable criticism. Twenty pigs were shown. This has been one of the most pleasing phases of the work this season as it has been instrumental in getting 47 boys and girls interested in purebred hogs. The class of Duroc Jersey sows at the Essex Fair for six months and under nine months, and for under six months were all won by pig club members, as well as first and second prize, for Duroc Jersey sows in the show."

Some other pig clubs organized differ from the Essex Club in that a pure-bred sow safe in pig, is distributed to each member instead of two pigs about six weeks of age. In the former case the initial outlay is greater but the members perhaps will realize more quickly on their investment.

Both Beef and Dairy Calf Clubs have been organized. The Dufferin County Shorthorn Calf Club has regulations similar to those of other calf clubs formed in the province but there was no special day set apart for distribution of the stock. The animals were purchased to suit the convenience of members and this, according to the representative, practically resolved the Club into a special order one.

In other Shorthorn calf clubs organized, heifers from 8-15 months have been distributed to the members. The initial cost in this case was not so great, yet a greater length of time will elapse before any returns are secured.

In some of the Shorthorn and Holstein calf clubs, auction sales were held in order that the members might secure money to pay off their notes. The members had the privilege of bidding in their own animals if they wished. An auction sale for club work has its advantages and disadvantages. If the animals turn out satisfactorily, they should be kept in the members' hands. It defeats the very object for which it was organized and hence these now being formed are not considering

the question of auction sales at all. There is this point in favor of auction sales and that is that it gives the club a great deal of publicity.

In the Halton County Calf Club, the 27 heifers distributed in February were sold at auction on August 20. A fair was held previous to the sale at which special prizes were awarded. The calves were divided into three classes according to the price paid for them:—

Class.	Range in Cost Price.	Number of Entries.
1	\$215-225	9
2	190-200	9
3	150-190	9

The Peel County Calf Club held a show and sale just one year after the dairy heifers were distributed to the members, when \$85 was offered in prize money by public-spirited persons.

The following extract is taken from the representative's report:—

"One heifer which had cost the member \$121.90 including years' interest, sold for \$235 netting a profit of \$113.10 on the cow alone. The heifer calf was valued at \$40, which would more than pay for the cow's feed for the year according to figures submitted in the record. The value of the milk may be added to the profit on the cow to estimate total profit. One member who won the championship on his grade Holstein has received over \$30 in prize money this fall. Another member's grade Ayrshire cost her \$56.20 and was bought in at \$105. She said she would not have let it go at \$150. Still another member has actually sold \$161.20 worth of milk from his cow since March."

All members in the Peel Dairy Calf Club had to submit records of

feed and milk together with a financial statement showing the profit on their enterprise.

SHEEP CLUBS

There has been only one sheep club formed during the past year and that was the Albion Sheep Club in the County of Peel.

In the previous sheep club formed in Peel a year ago, two Oxford Down, ewes in lamb were distributed to each member. Unfortunately some of the ewes proved not to be in lamb and others lambled unexpectedly in the middle of winter. This proved a hardship to some of the club members though the breeders from whom the ewes had been bought very kindly exchanged those without lambs for two shearling ewes each with a ewe lamb. The 14 members each with 2 sheep had 25 lambs and after the transfers had been made the average was just over 1 lamb per ewe.

In an endeavor to avoid the early lamb misfortune of last season, the representative from Peel organized a breeding flock in connection with the Albion Club. The shearlings were shipped in and flocked with a good pure bred ram on Nov. 12 which resulted in lambs being born at a time when the weather was more favourable.

LIVE STOCK CLUBS

There are two live stock clubs formed in the province, one in Waterloo County and the other in Brant County. They are confined to pure-bred animals, but they differ from the calf, pig, or sheep clubs already mentioned in that all classes of animals are included.

NOVA SCOTIA

SHORT COURSE FOR GIRLS

BY MISS HELEN J. MACDOUGALL, SUPERINTENDENT OF WOMEN'S INSTITUTES

A NEW feature was introduced into the Women's Institute work in Nova Scotia this year when a ten-day Short Course was held in July for young girls in cooking and serving of meals and the preparation of menus, at the Agricultural College, Truro.

In order that the work might be practical and that the students might receive the greatest benefit from the course, it was planned that the girls should prepare and serve their own meals at the College. This also helped to reduce expenses very considerably. Arrangements were made that the girls lodge in private homes in the vicinity. As the facilities for serving meals are limited it was necessary to limit the number of students to twenty. The first twenty who made application were accepted, and sixteen actually took the course.

The class was divided into groups, namely, cooks, waitresses, and stewards. The cooks prepared breakfast, and helped wash up. The

waitresses set the tables, served the food and washed the dishes. The stewards had charge of the food supplies, the care of the stove and general charge of the rooms.

The cooks reported early to prepare breakfast and this part of the work was finished in time for the whole class to be ready for a demonstration at 9 o'clock.

At the morning demonstration a dinner menu was planned and a demonstration on its preparation was given, as well as a talk on the theory of the work. After the demonstration the girls worked in pairs and prepared the food for their dinner. At the afternoon demonstration the supper menu was planned, a demonstration given and work assigned the girls for the preparation of supper.

Practical work was done in canning fruits and vegetables. Each girl canned some variety and made bread and biscuit in addition to the other work.

SASKATCHEWAN

COURSES IN FARM ENGINEERING

THE University of Saskatchewan announces that short courses of instruction on internal and combustion engines will be held at the College of Agriculture, Saskatoon, at three periods during the coming winter. The dates are Nov. 29 to Dec. 18; Jan. 3 to 22 and Feb. 7 to 26. The courses will be held under the direction of the Department of Agricultural Extension. The studies will cover the mechanism and operation of such engines as are used in farm work and including automobiles. In preparation for this course

a new tractor laboratory 154 by 75 feet has been added to the engineering building. This space provides ample room for the operation and testing of tractors. The laboratory is fully equipped with stationary and traction engines, automobiles, sections and models, and other necessary equipment for instruction purposes. The mornings during the course will be devoted to practical work and the afternoons to lectures. A fee of \$5 per week, or \$15 for each course, has been fixed.

ALBERTA

THE SCIENTIFIC STUDY OF FODDER PLANTS

WITH a view to supplying the demand for information on field crops from boys and girls, the University of Alberta has undertaken a survey and study of the wild or native grasses in the province. The information gathered from this study, which is being carried on under G. H. Cutler, B.S.A., Professor of Field Husbandry, will be made available to the farm boys and girls of the province that can be reached with the information. The work is being undertaken by an officer of the Department through the co-operation of the boys and girls themselves. The officer in charge of the work will spend one month, or a part thereof, each year in systematic and scientific study of the fodder crop possibilities in the north and other parts of the province. Many native grasses have already been secured as a result of the preliminary studies that were carried out by utilizing the services of the members of boys' and girls' clubs. For the guidance of the

boys and girls engaged in this work, Extension Circular, No. 3, Series 7, of the University of Alberta, has been prepared. This pamphlet explains the purposes of the study and instructs the students in writing down in detail particulars with respect to the various plants studied. The children are told to make collections to be brought to the boys' and girls' summer convention or to send them to the University by parcel post. The plants thus collected will be used in the courses of study. After the plants have been used for identification purposes and study with respect to their possibilities, specimens are being filed as the beginning of a complete collection of Alberta grasses. The members of the classes will be asked to collect seed from such varieties as give promise of value. The seed will be used by the University for the production of plants for more exhaustive study and improvement of forage purposes.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications, and Notes

EVENTS OF THE MONTH

October 20-21, Alberta Provincial Sheep and Swine Breeders' Association Sale, Edmonton.

October 26-28, Live Stock Association's Auction Sale of sheep, swine, and dairy cattle, Calgary.

COUNTY AGENT AND FARM BUREAU WORK IN THE UNITED STATES

At the Conference of the Agricultural Representatives held at the Ontario Agricultural College this season, Mr. L. R. Simons, Supervisor of Farm Bureau Work in a portion of the United States, described the system by which the County Agent and Farm Bureau Work in the United States is carried on. The work began in the South and it is now general over the United States. In the South the work was financed and directed by a General Education Board from funds administered through the United States Department of Agriculture. In the North the pioneer agent was required to create his job. This work had to be undertaken without a demand for it from the farmers who were in the beginning doubtful of the value of such assistance. To overcome the resentment of farmers in some quarters to the county agent, the control of the work was placed in local hands by means of county administrative committees. These committees, in many cases, include both farmers and business men. The result of this combination was to secure a recognition by the more public-spirited farmers of the importance of the work, and the need of the moral, active and financial support of the farming population.

EARLY FORMS OF COUNTY EXTENSION ORGANIZATION

The early forms of county extension organizations were a varied lot and were given various names but for purposes of description may be grouped into four classes, namely: (1) Dissociated Farmers' Clubs; (2) County Federation of Farmers' Clubs; (3) County Agricultural Council and (4) Farm Bureau.

The dissociated type consisted of non-federated agricultural clubs without a central organization. The term County Federation of Farmers' Clubs explains this type of organization. The County Agricultural Council is similar to the federation type except that each organized community is permitted to select a representative on the council. The early farm bureau was composed of a representative membership, an executive committee and usually an advisory council. Later the community committee was added to the farm bureau type.

These organizations are rapidly becoming standardized and are now usually called farm bureaux.

The South as well as the North eventually felt the need of a local extension organization both because of the broadening out of the work to include not only the farm but the farm home and work with the juniors necessitating the employment of additional county workers in a single county which required the acquirements of more local funds usually of a public sort and better organization to promote the work. The dissociated type of organization was first tried there, later developing into county councils, then into district or state organizations. The real farm bureau movement of the South began first in West Virginia shortly after it was fairly under way in the North.

DEVELOPMENT OF THE STATE FARM BUREAU

The development of a State Federation of Farm Bureaux naturally followed, soon after a large number of county associations were formed in any one state, chiefly for the purpose of correlating the work of the

county associations in a state-wide plan and to co-operate with the agricultural college in its promotion.

THE AMERICAN FARM BUREAU FEDERATION

Naturally, the next logical step was the organization of a National Farm Bureau, to be known as the American Farm Bureau Federation. The objects of this organization as given in its constitution "shall be to correlate and strengthen the state farm bureaus; to promote, protect and represent the business, economic, social and educational interests of the farmers of the nation and to develop agriculture."

This organization has outlined an ambitious programme including the establishment of (1) a bureau of transportation which will look into transportation matters both rail and water; (2) a bureau of trade relations which will investigate dealings with foreign countries; (3) a bureau of statistics, which will inquire into world conditions which influence supply and demand and will study the mechanics of prices; (4) a bureau of distribution which will make a thorough study of distribution of farm products; (5) a legislative bureau; (6) a bureau of co-operation which will make a special study of co-operative methods and aid state federations to promote local co-operative enterprises on thoroughly safe and truly co-operative lines.

This organization is given a semi-public standing through a clause in its constitution which gives the Secretary of the United States Department of Agriculture and the Director of the States Relations Service the privilege of attending all meetings of the executive committee and the right to take part in discussions.

CO-OPERATIVE MANAGEMENT OF COUNTY ASSOCIATIONS

The commonly accepted definition of the County Farm Bureau is "An association of rural people organized to develop and promote a rational programme of work in Agriculture and home economics in co-operation with local, state and national public agencies" and although there is some variation in the extent of its participation in the management of the work, the same fundamental principles exist generally throughout the entire northern and western territory and in many of the Southern States.

In many states the administrative board of the county bureau has full control of all local funds including appropriations of the county commissioners. In others, the power is limited to farm bureau membership funds. In others, particularly in the South the local board is purely advisory and has little to say about the use of any fund.

In the majority of the Northern and Western States the administrative board selects the county agent while in a few, the college exercises complete control of this function.

In the majority of states in the North and West the local board pays part of the agents' salary but in at least ten of these states this board pays nothing toward his salary and in many instances, none of his expenses.

In less than one-half of the northern and western states the college exercises complete supervision of the agent, while in the remainder, this function is co-ordinately exercised by the farm bureau and the college.

Practically all of the agricultural colleges recognize the county farm bureau as a partner with the public agencies in the conduct of "co-operative extension work in agriculture and home economics."

CO-OPERATIVE MANAGEMENT AND POLICIES OF THE STATE FARM BUREAU

A study of the constitutions of the State Federations of Farm Bureaux indicates that their purposes is usually to develop, strengthen, and correlate the work of the county farm bureaus through the development and promotion of a definite programme of work in co-operation with state and natural public agencies and usually provision is made for the extension director or county agent leader or both to meet and advise with the execution committee of the state federation.

METHODS EMPLOYED

The plan of recognizing the community as the basis of work is becoming more popular each year and bids fair to be generally accepted in a short time. The paid county workers assist a community committee in determining the outstanding problems, needing attention; community leaders are selected, each to direct some phase of the programme planned to correct or solve these problems and these committeemen assisted by the county extension workers work together in carrying out those measures which seem to fit local needs. Interest and co-operation on the part of the mass of people in the community is not secured directly by the county agent, the home demonstration, or the club leader but indirectly through the stimulation of leadership on the part of the community committeemen.

These community plans are assembled into a county programme by a committee appointed by the executive committee or by county project committees, each made up of the community committeemen, dealing with a particular part of the programme, for example, potato improvement with the potato committeeman or the executive

committee as chairman. The college subject-matter specialist plays an important part in the development of these county projects and renders all necessary assistance to the agents and the committeemen in promoting the work in the communities.

In a similar manner the county programmes are brought together into a state programme and the executive committee of the State Federation chooses a few outstanding state-wide problems in the solution of which concerted action of the State Bureau and the college is needed.

MAKE-UP OF THE PROGRAMMES OF WORK

County Farm Bureaux confine their efforts almost wholly to matters dealing with production and marketing including buying and selling. This is in sympathy with the principle of the Smith-Lever Law, (which corresponds in some measure to *The Agricultural Instruction Act* in Canada).

The general plan of dealing with these matters had been educational in character and the farm bureaux with two exceptions are not organized to deal with such matters directly. Independent subsidiary organizations are developed or existing organizations used and it is generally believed that this arrangement is just as conducive to the success of the marketing enterprise as for the bureau to handle it directly and is much safer for the bureau, as experience has shown, that assistance can better be rendered, if the bureau itself is not directly enmeshed in the difficulties.

No organization seems to have been permanently successful that attempted to deal with production, direct marketing, and

partisan politics. Each demands a particular type of organization and leaders with special training for that particular field of endeavor.

SUMMARY

The farm bureau is a county association of rural people; that it is developing and promoting a programme composed chiefly of projects dealing with production and marketing; that it does this in co-operation with trained agricultural, home demonstration and boys' and girls' club agents co-operatively employed by the bureau and county, state and national agencies; that this programme is largely educational in character; that this essential relation of the paid workers to the farm bureau is one of submerged leadership. The agent's success as a leader depends upon his ability to get work done by others without continually forcing his own personality to the front.

The State Farm Bureau Federations are for the most part organized to co-ordinate, correlate and standardize the activities of the county bureaux, and the American Farm Bureau Federation bears the same relationship to the State Bureaux.

The future success of the whole movement would seem to depend upon the attention given by all parties to development of sound, constructive community programmes of work and the selection of capable, willing community leaders to promote the important projects. The community is the foundation of the whole system and the community committees are the roots which feed the whole plant.

ASSOCIATIONS AND SOCIETIES

CANADIAN CO-OPERATIVE WOOL GROWERS

BY W. H. J. TISDALE, ASSISTANT MANAGER

At the time of writing, there is every indication that The Canadian Co-operative Wool Growers' Limited will handle approximately five million pounds of this season's clip—about one-third of the wool produced in Canada. Of this amount 160 carloads (3,250,000 lbs.) have been consigned to the Weston, Ontario, warehouse from the four Prairie Provinces. It is now being graded and satisfactory sales are being made in range wools at prices ranging as follows: Fine Staple, 50 to 52 cents; Fine Clothing, 47 to 51 cents; Fine Medium Staple, 58 to 60 cents; Fine Medium Clothing 52 to 55 cents; Medium Staple, 40 to 45 cents; Low Medium Staple, 35 to 38 cents; Coarse, 20 to 22 cents.

All the eastern wool has been graded and most of it sold at the following prices: Fine Medium Staple, 58 to 60 cents; Medium Staple, 50 to 55 cents; Low Medium Staple, 40 to 45 cents; Low Staple, 32 to 36 cents; Coarse, 24 to 25 cents; Burry and Seedy and Hard and Soft Cotts, 20 to 25 cents.

Of the total sales (2,000,000 lbs.) to date 112,000 pounds have been placed with the English trade, 1,200,000 pounds sold to the Canadian trade and 700,000 pounds to the American trade. The most pleasing feature in these sales is the increased interest being shown by Canadian mills in Canadian-grown wool. It is the very best possible evidence that the proper grading of our

wool under the supervision of the Live Stock Branch, Ottawa, is having its effect upon the Canadian mill man. His prejudice towards the home-grown product that he

used to receive in any old form is being rapidly broken down and he is beginning to realize that just as good wool is produced in Canada as elsewhere.

CANADIAN FLORISTS' AND GARDENERS' ASSOCIATION

The annual meeting of the Canadian Horticultural Association was held in Hamilton, Ontario, in August. The association, which consists largely of commercial flower growers, had representatives present from most of the provinces. It was decided to change the name of the association to the Canadian Florists' and Gardeners' Association. Provision was made that each province shall have a vice-president. The membership fee was increased from \$2 to \$3 per year. The next convention will be held in Quebec. By resolution the establishment of a Canadian Council of Horticulture was urged. The proposed National Botanic Gardens project was supported and Toronto

was favoured as the place for its location. Progress in the work of plant registration was reported and the chairman, Mr. H. J. Moore, was instructed to proceed with the work.

The following officers were elected: President, W. E. Groves, Hamilton, Ont.; 1st vice-president, C. J. Hay, Brockville, Ont.; 2nd vice-president, F. D. Clarke, Toronto, Ont.; secretary, H. J. Eddy, Montreal, Que.

A feature of the convention was a display of trade exhibits provided by floral firms in Montreal, Toronto, Hamilton, Washington, D.C., and other cities.

CANADIAN BROWN SWISS ASSOCIATION

BY RALPH H. LIBBY, SECRETARY

Members of the Canadian Brown Swiss Association made a display of forty head of Brown Swiss Cattle at the Sherbrooke Exhibition. The cattle were then taken to St. John, New Brunswick, and afterwards divided and sent to represent the breed at the Woodstock and St. Stephen exhibitions.

In order to give the Ontario stock men an opportunity to become acquainted with the breeders of Brown Swiss Cattle, we intend holding our next annual meeting at Toronto at the time the other Live Stock Associations hold their meetings.

ONTARIO VETERINARY CONVENTION

The annual meeting of the Ontario Veterinary Association was held at the Ontario Veterinary College, Toronto, on August 11th and 12th. The Hon. Dr. Tolmie, Minister of Agriculture, Dr. F. Torrance, Veterinary Director General, and Dr. A. Savage of Macdonald College, delivered

addresses. Clinics and demonstrations occupied one session. The following officers were elected: President, Dr. J. A. Campbell, Toronto; 1st vice-president, Dr. W. F. Clark, London; 2nd vice-president, Dr. Thomas Buckley, Toronto; secretary-treasurer and registrar, Dr. S. Glover, Toronto.

NEW PUBLICATIONS

DOMINION EXPERIMENTAL FARMS

Farm Business in Quebec. Bulletin 96 of the Dominion Experimental Farms constitutes the results of a preliminary agricultural survey in one district in each of six counties in the province of Quebec. The survey was made by Mr. J. A. St. Marie, B.S.A., of the Division of Animal Husbandry. The farms surveyed were grouped in the neighbourhood of six illustrations stations, supervised by the Dominion Experimental Farms system.

ONTARIO

The Uses of Milk and Its Products. The Women's Institutes Branch of the Ontario Department of Agriculture in circular number 31, deals with the uses of milk and its products, the value of dairy products, and contains recipes for many milk foods including the making of soft cheese.

Information and Recipes on Vegetables, Fruits, and Salads is the title of Circular number 32 issued by the Women's Institutes Branch of the Ontario Department of Agriculture. The pamphlet concludes with a list of 25 salad combinations.

NOVA SCOTIA

Proceedings of the Entomological Society of Nova Scotia for 1919. This pamphlet contains proceedings of the fifth annual meeting of the Entomological Society of Nova Scotia, which was held at Truro in July 1919.

MANITOBA

The Department of Agriculture and Immigration. The annual report of the Department of Agriculture and Immigration of the province of Manitoba for the fiscal year ending November 30, 1919, includes besides the report of the Department proper, that of the Manitoba Agricultural College and of the Agriculture Extension Service Branch.

MISCELLANEOUS

Canadian Live Stock Future, is the title of a pamphlet issued by the Industrial and Development Council of Canadian Meat Packers. It contains in figures and facts, results of investigations of world meat market conditions, that indicate prosperity for the live stock industry for at least ten years. This pamphlet is distributed by the courtesy of Canadian banks.

The Canada Year Book, 1919. The 1919 edition of the Canada Year Book, published by the authority of the Honourable, the Minister of Trade and Commerce, has been issued. In addition to the usual statistical and other information this volume devotes 64 pages to the history of the Great War.

The Canadian Annual Review. This volume, which is for 1919, published by J. Castell Hopkins, deals with developments of a constitutional and international character. Local subjects dealt with include references to the growth of the farmers' movement, the developments in labour, industry, and education, and the visit of the Prince of Wales.

NOTES

Mr. R. G. Knox has been appointed to succeed Mr. McBeath, Lecturer in Animal Husbandry at the Ontario Agricultural College.

Mr. S. A. Gandier, Secretary and Registrar of the Ontario Agricultural College, has resigned his office to take up a further study of chemistry. He is succeeded by Mr. A. M. Porter.

A Barred Plymouth Rock pullet, under test at the Kentville, Nova Scotia, Experimental Station, laid 136 eggs in 147 days this year. One hundred and four eggs of this production were laid in 104 consecutive days commencing on the 13th of February.

Mr. M. C. McPhail, B.S.A. has been appointed Agricultural Representative in Durham County, Ontario, succeeding Mr. E. K. Hampson who has joined the staff of the Agricultural School at Kemptville.

Mr. F. E. Buck, who since 1911 has been in charge of the landscape gardening and floricultural section of the Horticultural Division of the Experimental Farm, has accepted the Assistant Professorship of Horticulture in the University of British Columbia. Mr. Buck is of English birth. He received his education in England, Cornell University and Macdonald College.

Mr. W. J. Black, chairman of the Soldier Settlement Board has resigned this office to assume an executive position in the National Liberal and Conservative Party. Mr. Black is succeeded on the Soldier Settlement Board by Major John Barnett. In March 1919, Major Barnett joined the staff of the Soldier Settlement Board as Superintendent of the Calgary Office, later becoming Provincial Solicitor of the Board for Alberta, and in October last, he was appointed General Council of the Board for the Western Provinces with Headquarters at Calgary.

Mr. J. B. Munro, B.S.A., for fifteen months Assistant Editor of the *Agricultural Gazette*, has been appointed District Supervisor of Agricultural Instruction at Armstrong, B.C.

A co-operative company known as the Manitoba Co-operative Dairies Limited, has been registered under the Co-operative Laws of the province of Manitoba. It is designed as a purely farmers company and is intended to embrace the whole province where dairying is carried on. Its objects are to purchase milk and cream from the farmers of the province, to manufacture butter, ice cream and other dairy products and to distribute these for city consumption.

The Canadian Society of Technical Agriculturists will commence in January, 1921, the publication of a technical magazine which will be the organ of the society. The new magazine will be entitled "Progressive Agriculture in Canada." It will be edited by Mr. F. H. Grindley, B.S.A., the secretary of the society. Mr. Grindley will have headquarters at Gardenville, which is close to Macdonald College, Quebec.

The Live Stock Branch of the Ontario Department of Agriculture, is having taken this year a set of motion picture films of outstanding herds of the different breeds of cattle raised in the province. Copies of these films will be made available to the agricultural representatives for the short course school work this coming Autumn and Winter when the better bull campaign will be vigorously pursued.

INDEX TO PERIODICAL LITERATURE

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August 28.

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The Show-ring and Commercial Live Stock Industries. H. Barton, B.S.A., Professor of Animal Husbandry, Macdonald College, Que., page 6.

How to Show Cattle—The Finishing Touch. G. B. Rothwell, B.S.A., Dominion Animal Husbandman, Ottawa, Ont., page 8.

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How to Maintain a Profitable Market for Beef. H. S. Arkell, M.A., B.S.A., Dominion Live Stock Commissioner, Ottawa, Ont., page 3.

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Future of Ontario's Apple Industry. P. J. Carey, Packing Demonstrator, Dominion Department of Agriculture, Toronto, Ont., page 251.

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Exhibitions in Relation to Horticulture. W. T. Macoun, Dominion Horticulturist.

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PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

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CROPS AND CULTIVATION

The Cooling of the Soil at Night, with Special Reference to Late Spring Frosts.—FRANKLIN, T. B., in *Proceedings of the Royal Society of Edinburgh*, Vol. 39, No. 2, pp. 120-136. Edinburgh, 1918-19.

Observations on temperature and moisture in a garden soil consisting of a layer of loam rich in humus, about 6 in. deep, resting on a stony subsoil of quite different character, on calm clear nights during the winter (November to March) of 1918-19 are reported. These indicated that (1) The radiation from the soil may be accounted for in counterbalancing the upward conduction and the latent heat of freezing—the residue only cooling the soil. (2) The rate of radiation of the soil on calm clear nights, when fifth magnitude stars are visible, is a function of the relative humidity. (3) Other causes such as condensation, evaporation, etc., have little effect on the temperature of the soil on calm clear nights. (4) The surface tends to fall rapidly such a number of degrees below the temperature of the 4 in. depth as will make the conduction from this depth balance the radiation; after this takes place the surface temperature can fall no faster than that of the 4-in. depth, and a sufficiently high temperature underground will obviously render a frost unlikely. (5) This temperature difference between the surface and the 4-in. depth, which makes the upward conduction balance the radiation, is probably about 10°F. during the winter, when the soil is almost invariably wet, and of uniform maximum conductivity from day to day, but may be as much as 20° after a dry spell in spring or early summer. (6) The prediction of frost on any given night depends on the possibility of assessing the value of the following: (a) average relative humidity during the night, (b) the temperature of an assigned depth—say 4 in.—at the time of surface minimum, (c) the conductivity of the layer between the assigned depth and the surface, (d) the difference between

the surface soil minimum and that of the air above it. (7) It might be possible, after an extended series of observations with a set of electrical resistance thermometers, to forecast the minimum temperature on calm clear nights from observations taken in the early afternoon.

By covering the earth with a layer of ashes or by putting a shelter over it, it was possible to keep the soil 10° warmer than in the open. Soil under natural moss and grass was also 10° warmer than open soil. Loose raked soil was 3° warmer than soil not so treated. Soil covered with manure was 6.5° warmer, and with cover of fallen leaves 7° warmer than uncovered soil. Warm rains also decidedly increased the temperature of the soil.

The Washing out of Nitrates by Drainage Water from Uncropped and Unmanured Land.—RUSSELL, E. J., and RICHARDS, E. H., in *Journal of Agricultural Science*, Vol. 10, No. 1, pp. 22-43. Cambridge, England, 1920.

This article supplements and brings up to date a report by N. H. J. Miller, published in 1906, and also reviews all of the results of the work since 1877, when systematic determinations of nitric nitrogen and chlorin in the drainage water of the Rothamsted drain gauges were begun.

Broadly speaking, the results show that uncropped land steadily and persistently loses nitrogen in the form of nitrates. This, of course, was known. The unexpected feature is the slowness with which the soil loses the power of producing nitrates from its own stock of nitrogenous compounds. At the beginning of the experiment the soil contained 0.146 per cent of nitrogen, about 3,500 lbs. per acre in the top 9 in.; it yielded up about 40 lbs. of nitrogen per acre per annum to the drainage water. At the end of nearly 50 years it still contains 0.099 per cent of nitrogen, or 2,380 lbs. in the top 9 in., and it still gives up to the drainage water 21 lbs. of nitric nitrogen per acre per annum, enough to produce a

15-bu. crop of wheat, although neither manure nor crop residues have been added during the whole of the period. If the curve showing the rate of fall continued its present course and without further slowing down, no less than 150 years would be needed for exhaustion of the nitrogen.

So far as can be ascertained, the nitrogen lost from the soil appears wholly as nitrate in the drainage water. From the top 9 in. of the 20-in. and 60-in. gauges the nitrogen lost has been, respectively, 1,124 and 1,172 lbs. per acre. The nitric nitrogen in the drainage water amounts to 1,247 and 1,200 lbs. per acre in the two gauges. These figures are arrived at by adding together the whole of the nitrate found and such estimated amounts as are possible for the first seven years before regular determinations were made, deducting nitrogen introduced by the rain. The subsoil is left out of account, but evidence is adduced to show that it contributes little if anything to the nitrate in the drainage water. Two items admittedly lack precision, being estimates only, but they are based on reasonable grounds and are probably not far wrong.

The nitrate in the drainage water showed a closer relationship to rainfall than to any other single factor, and nearly as clear a relationship to the quantity of water percolating through the gauges. It is found, however, that exceptionally wet or dry years have after effects which persist in the following season. During an exceptionally wet year the soil not only loses a large amount of nitrate, but apparently to some extent the power of producing nitrate. In some of the very dry years the opposite effect is seen; less nitrate is washed out than is usual during the period, but more is washed out in the following year. On an average 1 in. of rain has for the past 25 years washed out 1 lb. of nitrogen, and for 15 years before that it washed out 1.1 lb.; only in the last 6 years is there any distinct sign of falling off.

The effect of temperature is largely masked by that of rainfall, although the data indicate a relationship between summer sunshine and the loss of nitrates during the following winter, the loss tending to be higher after a hot summer than after a cold one. It is noted, however, that this effect is not a simple one because a hot summer is usually also a dry one.

The recorded data for chlorin show a very close agreement between the amount in the rain water and that recovered in the drainage water. The amount of chlorin in the rain water during the 27 years of observation was 441.5 lbs. per acre, the amount in the drainage water being 441.53 lbs. for the 20-in. drain gauge, 455.8 lbs. for the 40-in. gauge, and 447.58 lbs. for the 60-in. gauge.

Effect of Various Soluble Salts and Lime on Evaporation, Capillary Rise, and Distribution of Water in Some Agricultural Soils.—WOLKOFF, M. I., in *Soil Science*, Vol. 9, No. 6, pp. 409-436. Baltimore, Md., 1920.

Soil fertility cannot be maintained if crops are removed from the land and not enough of the plant-food returned to the soil to compensate it for the loss. In spite of some contentions to the contrary, it cannot even be maintained, if a strictly livestock type of farming is practised, in which all crops are fed to the farm animals and manure is carefully preserved and returned to the soil. If animals themselves or animal products, such as milk, cheese, wool, eggs, etc., are removed from the farm, a considerable amount of soil fertility is carried away. As a general rule, the barnyard manure is not carefully conserved on American farms, and before it reaches the field more or less of the plant-food is lost through ammonification, leaching, etc. Moreover, there is a considerable loss of plant-food from soil in the drainage water through washing during excessive rains and leaching. If we are to preserve the present status of soil fertility, therefore, we must in some way periodically compensate soil for the constant loss in its fertility. This being established, it implies that such compensation on a national scale must be largely in the form of the application of some chemical fertilizers, the nature of which might vary considerably, depending on the character of the soil, climatic conditions, and the systems and methods of farming.

Soil moisture is one of the most important factors in crop production. Broadly speaking, the conservation of soil moisture in order to have an ample water supply at the proper time for the germination of seed, growth and development of crops is a subject of much study and consideration among the agriculturists of today. The present study was undertaken with the hope of obtaining some additional information on the subject of the effect of some chemical substances on evaporation, capillary rise and distribution of water in some agricultural soils.

The experimental work recorded in this paper was performed with ammonium sulphate, potassium sulphate, magnesium sulphate, sodium chloride, calcium nitrate, potassium phosphate and calcium oxide, with which some agricultural soils were treated in order to ascertain the influence these salts and the base would have on the evaporation, capillary rise and eventual distribution of water in soil.

The indications are that the following conclusions might be drawn from the results obtained:

Soluble salts materially decrease the evaporation of soil moisture.

There is a direct dependence of the efficiency of salts in decreasing the water evaporation upon the osmotic concentration of the soil solution in the surface inch of soil. With few exceptions the results tend to show that the greater the osmotic concentration of soil solution in the first inch of soil the greater is the depression of the evaporation of moisture.

For the soluble salts studied sodium chloride and calcium nitrate were most effective in checking the evaporation of water, and potassium sulphate and potassium phosphate were least effective, while ammonium sulphate and magnesium sulphate occupied an intermediate position.

Calcium oxide in this respect was least effective in sea sand and sandy loam and most effective in clay loam, as compared with the soluble salts studied.

With two agricultural soils sodium chloride decreases the capillary rise of water. Calcium oxide in drab clay and potassium phosphate in brown silt loam show a tendency to accelerate the water rise. Ammonium sulphate shows no pronounced effect, when applied in the same amount.

Sodium chloride, potassium phosphate and calcium oxide very materially influence the distribution of moisture in brown silt loam. There is a very pronounced tendency for treated soil to contain more water in the first 8 inches, as compared with the untreated soil.

Soil treated with potassium phosphate or calcium oxide even in the surface inch contained more water than the untreated soil, and yet evaporation from treated soil was decreased.

Comparing the untreated soils, when water was supplied at 12 inches below the surface, the extent of evaporation depended on the texture of the soil. With the increase in the amount of fine material in the soil the evaporation increased.

Taxing the Air for Increased Food Production.—LIPMAN, J. G., in *Journal of the American Society of Agronomy*, Vol. II, No. 9, pp. 333-341. Washington, D.C., September, 1919.

The author discusses the more systematic and intensive use in agriculture of nitrogen compounds that are the resultants of electrochemical and microbiological processes. Considerable statistical and economic data on nitrogen losses from soils are given, it being estimated that the annual loss from the arable land in the United States will amount to approximately 9,000,000 tons of nitrogen. In this connection it is pointed out that the nitrogen compounds added to this arable land in the form of animal manures, leguminous green manures and residues, the body substances of nonsymbiotic nitrogen-fixing organisms, ammonia and nitric acid in atmospheric precipitation, and nitrate,

ammonia and organic nitrogen in commercial fertilizers represent an equivalent of 5,000,000 to 6,000,000 tons of nitrogen, leaving a net annual deficit of possibly 3,000,000 to 4,000,000 tons of nitrogen. The fixation of atmospheric nitrogen is discussed, and a plea is made for further research and demonstration on the manufacture and use of nitrogenous fertilizers.

Fertilizer vs. Manure for Continuous Vegetable Growing.—HARTWELL, B. L., and DAMON, S. C., in *Rhode Island Agricultural Experiment Station, Bulletin* 182, pp. 11, Kingston, R.I., 1920.

Ten cords of manure per acre have been compared annually, for sixteen consecutive years, with fertilizer containing an average of 96 pounds of nitrogen, 170 pounds of phosphoric oxide and 150 pounds of potassium oxide, which is about the equivalent of 2,500 pounds of a 5-6-6 fertilizer.

The soil has been tilled each year and garden crops grown fairly intensively most of the time, although some attention has been given to cover crops for green manuring.

At the end of the first decade there were about 800 pounds more nitrogen in an acre foot of the manure area than of the fertilizer area. Using only average data, it is estimated that 1,000 pounds more nitrogen had been added previously in the manure than in the fertilizer.

Since nitrogen was twice as abundant in the manure as in the fertilizer, whereas the amounts of the other fertilizer elements were more nearly alike, brief consideration is given to the nitrogen problem as it concerns intensive market gardeners when forced to reduce their use of the highly nitrogenous stable manure.

After the first few years, the crops have generally grown better with the manure than with the fertilizer. It remains to be seen whether an increase in the amount of nitrogen added to the fertilizer area will result in the same average crop production from the two areas.

Crop Injury by Borax in Fertilizers.—SCHREINER, B. E., in *United States Department of Agriculture, Circular* 84, pp. 35, Washington, D.C., 1920.

Earlier experiments and observations by others bearing on the subject are reviewed, and preliminary field experiments on the influence of a Searles Lake potash salt containing 6.25 per cent borax ($\text{Na}_2\text{B}_4\text{O}_7$) when used in complete fertilizers having from 2 to 8 per cent potash on potatoes and cotton are reported, which were carried out in co-operation with farmers in the States of Maine, New York, New Jersey, Virginia, North Carolina, South Carolina, and Georgia.

Investigation of cases in certain sections growing potatoes and cotton indicated the

use in fertilizers of potash salts containing borax in what proved in practice to be excessive quantities. The higher the potash content of such mixed fertilizers the higher was also the borax content and the greater the damage to the crop. This damage was greatest when the fertilizer had been drilled in with the seed, and was more severe where the soil and climatic conditions were such as to leave the fertilizer and seed, of the sprouting seed, too long in contact with the borax-containing salts. The greatest damage was done to germination, which was either entirely prevented or much delayed, sometimes many weeks. This showed itself in many missing hills, producing a poor stand and consequently a reduced yield.

It is not thought likely that damage of a permanent character has resulted this year on the fields subjected to this borax trouble. This is indicated by the fact that rainfall immediately following the application of the fertilizer, a moister condition of the soil when applied, a slightly reduced quantity used, owing to the improper regulation of the drill, or a better distribution in the soil, especially when broadcasted, all tend towards a marked reduction, even to the vanishing point, in the harmful effect of the borax.

Analyses showed that the borax content in many commercial mixtures found on affected farms was rather high, varying from 0.73 to 2.3 per cent. An examination of the potash salts occurring in commerce showed that some contained as much as 12, 20, and even 30 per cent of borax.

In the field experiments no such serious injury has resulted as occurred in commercial fields, but even here the yields were materially affected.

In addition, greenhouse studies with pots to obtain data on the limits of toxicity of borax are reported. A large number of fertilizer mixtures were used with wheat and cotton as the plant indicators of toxicity, and with a much wider range of borax content than was feasible in the field experiments. This indicated for wheat plants a toxic limit of 2 to 3 pounds of borax per acre, while with cotton this toxic limit appeared to be higher, between 8 and 9 pounds per acre. The reactions were in all cases decisive and left no doubt as to the poisonous action of the borax on the plants.

New Field Crop Plant Introductions.—HANSEN, N. E. in *South Dakota Agricultural Experiment Station Report*, 1919, pp. 29-33. Brookings, S.D.

Plant introductions, including durum wheat, alfalfa, proso, sweet clover, and Chee grass (*Lasogrostis splendens*), made by the author a number of years ago from Russia and Siberia, are enumerated, and the more important species and varieties are described,

mainly as to their cold and drought resistant characters. It is pointed out how new strains have been developed from the original material and what progress has been made in testing and distributing varieties of value under South Dakota conditions. A hybrid alfalfa known as Cossack and marked by a very light-coloured variegation, including many white flowers, is reported as successfully grown on an extensive scale in the western part of the State. A selection from Cossack alfalfa made to develop a white-flowered variety came about 70 per cent true to white colour two years ago, and was about 97 per cent white during the past season. Semipalatinsk alfalfa, it is stated, has proved thoroughly hardy in Saskatchewan.

Selection work with Hansen White Siberian proso was conducted to develop a pure line and a select variety, and efforts were put forth to establish the use of proso as a new cereal for table use. Hansen White Siberian sweet clover and Chee grass are reported as giving good results as far north as Saskatoon, Sask. Chee grass is described as growing up to 16 ft. or more in height on pure alkali soils on the dry steppes of the Semipalatinsk province of Western Siberia.

Experiments with Tomatoes.—OLNEY, A. J., in *Kentucky Experiment Station Bulletin*, 218, pp. 149-159. Lexington, Ky.

The results are given of a series of experiments with tomatoes started in the spring of 1916 to determine the effect of various methods of pruning and staking on the yield, earliness of ripening, and size of the individual fruits. Some data were also secured relative to methods of raising plants, planting distances, proper length of stakes, etc.

Summing up the results of three seasons' work, the author found that pot-grown plants were much more productive than flat-grown plants. Staking and pruning reduces the yield of marketable fruit per plant, but increases the yield per acre because of the greater number of plants that may be set. Generally speaking, the yield per plant is in direct proportion to the number of bearing stems. On the whole, pruning to two stems has given the best results.

Pruning increased the size of the individual fruits, and pruned and staked tomatoes ripened approximately one week earlier than those untrained. Plants trained to two stems, set 2 by 4 ft. apart, yielded less per plant but much more per acre than similar plants set 4'5 by 5 ft. apart and also more per acre than untrained plants set 4'5 by 5 ft. apart. A range in length of stake from 4 ft., 2 in. to 5 ft., 6 in. has little effect on the total yields.

The author concludes that it does not pay to stake and prune tomatoes for the canning factory, although it may pay in the home

garden or in very intensive trucking areas. The cost of stakes, the additional labour involved, and the greater number of plants required may be the limiting factors for profitable staking and pruning.

American Foulbrood.—WHITE, G. F., in *United States Department of Agriculture, Bulletin* 809, pp. 46, Washington, D.C., 1920.

This monographic account is similar in nature to the works of the author on sacbrood and on *Nosema* disease. The work has been summarized by him as follows:

American foulbrood is an infectious disease of the brood of bees caused by *Bacillus larvæ*. All larvæ, worker, drone, and queen are susceptible to the infection; adult bees are not. Man evidently is not susceptible to infection with the organism nor are the experimental animals. So far the disease has not been encountered or produced in other insects than honeybees. The brood of bees can be infected through feeding the spores of the bacillus to a colony. The spores contained in a single scale are more than enough to produce considerable disease in the colony. The portal of entry of the infecting agent is somewhere along the alimentary tract of the larva, most likely the stomach (midintestine). Practically speaking there are no secondary invaders either during the life of the infected larva or during the decay of the remains. The incubation period is approximately 7 days. The brood is susceptible to infection at all seasons of the year. More brood dies of the disease during the second half of the brood-rearing season than during the first half.

The disease is present at least in Australia, New Zealand, Denmark, England, Ireland, Germany, France, Switzerland, Canada, Cuba, and the United States. The rosy foulbrood of all these countries is one and the same disease. Occurring as it does in such a wide range of climatic conditions, it is evident that the presence of the disease cannot be attributed alone to any particular climate.

The course of the disease in the colony is not affected greatly, if at all, by the quality of food used by the bees, or by the quantity present. Colonies in which the disease has been produced through artificial inoculation can be kept in the experimental apiary without transmitting the disease to others. This fact is of special importance not only in the technique of making studies, but also in the control of the malady.

The spores of American foulbrood remain alive and virulent for years in the dry remains (scales) of larvæ and pupæ dead of the disease and in cultures that have become and remain dry. The spores are very resistant to most destructive agencies. A variation in resistance is noted both as to the individual spores of a sample and as to the spores contained

in different samples. Many of the spores are killed within 1 minute at 100°C., and all of them from some samples are killed in less than 5 minutes. In some instances 96° maintained for 10 minutes will destroy all the spores, while 98° will often do it. The most resistant of the spores studied when suspended in water have not withstood 100° for 11 minutes. The spores withstand more heating when they are suspended in honey or honey diluted with water than when suspended in water. The spores suspended in honey or diluted honey can be destroyed by 100°, but it may require half an hour or more to do so.

American foulbrood spores when dry were destroyed by the direct rays of the sun in from 28 to 41 hours. The spores when suspended in honey and exposed to the direct rays of the sun were destroyed in from 4 to 6 weeks. The spores when suspended in honey and shielded from direct sunlight remained alive and virulent for more than a year. It is very likely that they are capable of remaining so for a very much longer period.

The spores resisted the destructive effects of fermentation for more than 7 weeks at incubator and outdoor temperatures, respectively, and probably are able to withstand these agencies for a very much longer period. The spores resist carbolic acid at room temperature in strengths ordinarily used as a disinfectant for periods of months; 1 to 1,000 mercuric chloride for days; 10 per cent formalin for hours. Experiments recorded in the present paper indicate that drugs do not materially affect the course of the disease.

American foulbrood infection is transmitted primarily through the food of bees; possibly at times to some extent through their water supply. Robbing from the diseased colonies of the apiary, or from neighbouring apiaries, is the most likely mode by which the disease is transmitted in nature. The placing of brood combs containing diseased brood with healthy colonies will result in the transmission of the disease. Flowers should not be considered as a likely medium through which infection may take place. Whether the disease is ever transmitted by queens or drones has not been determined. That they have been overestimated at times as possible sources of infection seems likely. It is quite probable that in many cases hives which have housed colonies infected with American foulbrood will not transmit the disease to healthy colonies transferred to them. Results from the present studies confirm the observation made by beekeepers that danger from this source may be removed by properly flaming such hives inside. The clothing of those about an apiary, and the hand of the apiarist are not fruitful sources for the transmission of the disease. Tools and bee supplies generally about an infected apiary will not

transmit the infection in the absence of robbing from those sources.

American foulbrood usually can be diagnosed from the symptoms alone. A definite diagnosis can always be made from suitable samples by bacteriological methods. The prognosis in the disease in the absence of treatment is decidedly grave, but with proper treatment it is favourable. From the technical viewpoint many of the problems considered in these studies have been solved only partially; from the practical point of view, however, the results are sufficient to make a logical, efficient, and economic treatment of American foulbrood possible.

A list of 29 references to the literature is appended.

A Study of the Behaviour of Bees in Colonies Affected by European Foulbrood.—STURTEVANT, A. P., in *United States Department of Agriculture, Bulletin* 804, pp. 28, Washington, D.C., March, 1920.

European foulbrood is known to be an infectious disease due to *Bacillus pluton*, the incubation period being from 36 to 48 hours. During the first 5 to 7 days after the colony becomes infected the spread in the disease is slow; after this interval the disease increases rapidly under favourable conditions. The critical time to detect the disease and begin treatment is therefore early in its course. Evidence tends to confirm the theory that one of the ways by which the disease is spread in the colony is by the house-cleaning bees, and from colony to colony by their drifting. Infection is probably carried on the mouth-parts and feet; the question of infection from the intestinal contents or from the source of larval food at various stages needs further substantiation. Italian bees offer the greatest resistance to the disease, perhaps owing to their vigorous house-cleaning habits rather than to any natural immunity. Infection does not seem to be always removed by a period of queenlessness. Re-queening is generally necessary, except possibly in the strongest Italian colonies. A heavy honey flow tends to prevent infection from gaining a foothold, and also tends to eliminate the disease if present when the heavy flow begins. European foulbrood is a disease of weak colonies; it is difficult to infect any but very weak colonies during a heavy honey flow; therefore, colonies kept strong up to the time of the honey flow run very little danger of contracting the disease.

AGRICULTURAL INDUSTRIES

Cold Storage for Apples.—WHITEHOUSE, W. E., in *Iowa Agricultural Experiment Station, Bulletin* 192, pp. 179-216. Ames, Iowa, 1919.

A report of the progress made in the station's long-continued apple-storage investigations. The first part of the report

contains the results of investigations and observations relative to the development and control of apple scald and certain apple rots. The second part discusses changes in temperatures of cold-stored apples, as affected by different methods of packing the fruit. A bibliography of related literature is given, and the station's cold-storage plant is described.

Summing up the results of his study, the author concludes that temperature is a very important factor in the control of apple scald and of other more common diseases of apples in cold storage. A constant storage temperature no higher than 32°F. has given the best control of these diseases. It is concluded, however, that the losses in storage from apple rots may be practically eliminated by proper spraying, harvesting, handling, grading, and packing the fruit, keeping it at a constant low temperature and removing it from storage before the storage season for the particular variety in question closes. No correlation was found between the size of the apples and the amount of scald developing on them in storage, but the largest apples were generally attacked more quickly by rots in storage than smaller apples of the same variety, other things being equal. Apple scald makes fruit more susceptible to the entrance of rot fungi. *Alternario* rot, which is a black fungus growth, develops readily on the badly scalded portions of the fruit and hastens decay. The author has had under observation an unidentified dry brown rot, which appeared on both Jonathan and Northwestern Greening apples, developing sunken areas in which the skin becomes a clear-brown colour, varying from a medium to a rather light tone and remains unbroken. The flesh beneath becomes dry and brown, or brownish, to a depth of 0.125 to 0.25 in. All attempts to isolate a causal parasitic or saprophytic organism from the affected tissue have thus far failed.

Humidity was found to bear some relation to the development of apple scald, but was less important than temperature. Less scald developed in a relative humidity of from 60 to 70 per cent than in one of from 80 to 90 per cent. Wrapping apples in paper delayed the appearance of scald during storage. Paraffin paper retarded scald more than ordinary wrapping paper, but the difference was too slight to be of commercial importance. Immature fruit scalded readily in storage. Whatever the variety of apples under consideration it is in the best condition for cold storage when it is well coloured and hard ripe. If the fruit must be picked early to avoid freezes it may be held at ordinary temperatures until it more nearly reaches the best degree of maturity for cold storing. Apples in prime maturity for cold storing will scald more quickly in common than in cold storage. Iowa-grown Mammoth Black Twig and Sheriff apples can be stored with

only fair success in common storage houses, and should be allowed to get as much red colour as possible before packing.

Observations on temperature changes in cold storage showed that it requires 30 to 60 hours to reduce the temperature of fruit in the centre of a box or barrel from a temperature round 70° down to 35°, the temperature of apples in boxes being reduced sooner than that of apples in barrels. Unwrapped apples packed in boxes were more quickly affected by changes in storage temperatures than similar wrapped apples. Small changes in room temperatures do not materially change the temperature of fruit in the package particularly of wrapped fruit. The author points out the importance of not exposing picked apples to the sun either in the orchard or in the packing shed, as they absorb considerable heat, and when first placed in cold storage, apples which have absorbed heat during the day do not cool off readily at night even though the nights are comparatively cool. When the fruit is ready for storage it should be cooled to 32° as quickly as possible.

Reduction in the Russian Flax Acreage.—*United States Market Reporter*, August 14, 1920. Washington, D.C.

The area sown to flax before the Bolshevik revolution amounted to 2,900,000 acres in 25 governments of European Russia. In 1918 about 30 per cent of this area was outside of Bolshevik Russia (in Esthonia, Latvia, Lithuania, Poland, etc.). The area sown to flax in 1918 in Soviet Russia was 1,890,000 to 2,025,000 acres, and in 1919 it had fallen 50 to 60 per cent. In 1920 it will probably constitute not more than 15 or 20 per cent of the area sown before the war.

Before the war the stocks of scutched flax warehoused in Russia amounted to about 420,000 long tons, or four-fifths of the world's supply. In 1919 about 97,000 tons of flax were put into warehouses, and it was expected that in 1920 there would be 84,800 tons. Up to March, 1920, however, there had been collected only 16,000 to 24,000 tons, although the season for storing in the warehouses was already finished. The actual stocks therefore amount to only about 25 per cent of the quantity expected, and will scarcely satisfy the requirements of the domestic industry.

In 1916 the Russian spinners worked 94,500 tons of flax and manufactured 66,400 tons of thread. In 1918 the quantity of thread manufactured was 25,300 tons, or about 38 per cent of the 1916 quantity, and in 1919, 15,300 tons, or about 23 per cent of the 1916 figure. Taking into account that the spinning at the present time is coarser than formerly, it follows that the production of the Russian spinners has diminished even more than the figures would indicate.

Besides the production of the factories a large quantity of flax, 80,600 tons, according to estimates, is spun in the peasant homes. The domestic industry thus requires under normal conditions at least 161,300 tons.

In 1918 the co-operative societies that were members of the Central Association of Flax Growers collected 40,300 tons of flax, which was about 16 to 21 per cent of the total harvest for the year. In 1919, according to the statistics of the Soviet government, the yield of flax was 60,600 tons, of which the co-operative societies collected 39,900. In 1920 the Central Association of Flax Growers was deprived of the right of participating in the collection. The local agricultural co-operatives were reorganized, and the collection of flax was taken over by agents of the government.

According to the data of the Soviet government's central organ for purchasing, the depots of the state held on Jan. 1, 1920, a stock of 29,000 tons of flax, of which 8,000 were for export.

PLANT DISEASES

Presoak Method of Seed Treatment: A Means of Preventing Seed Injury due to Chemical Disinfectants and of Increasing Germicidal Efficiency.—BRAUN, H., in *Journal of Agricultural Research*, Vol. 19, No. 8, pp. 363-392. Washington, D.C., 1920.

This article, which is a contribution from the United States Bureau of Plant Industry, is summarized as follows:

The use of formalin and copper sulphate as now practised usually causes retardation and injury to seed germination.

Greenhouse and field experiments here reported have shown that this detrimental effect can be eliminated for standard varieties of wheat by allowing the seeds to absorb water for six hours before submitting them to the treatment with formalin or copper sulphate. Soaking for a short period (10 minutes) and covering for 6 hours, here designated the presoak method, is better than leaving in water for 6 hours. Similar results were obtained in experiments with barley, oats, and corn.

The saturation of the seed cells and cell walls with water during the presoak period appears to be the factor counteracting the injurious effect on seed germination by diluting the disinfectant beyond the point of injury as it diffuses into the tissues and also by considerably decreasing the amount of water plus disinfectant solution which may enter the tissues after presoaking as compared to what may enter without any presoaking.

Actual stimulation of germination has been observed repeatedly in presoak-treated seeds, a factor which by shortening germination minimizes the danger of exposure

to the attack of soil organisms during this susceptible period.

The bacterial blackchaff disease of wheat can be controlled without any injury to seed germination by a 6 hour presoak of surface-infected seeds in water followed by a 6-hour treatment with formalin 1 to 400 in the manner prescribed.

In practice, wheat seeds after being screened should be soaked with water for 10 minutes at about 6 o'clock in the morning, drained, covered, and set away moist till noon, then soaked with formalin 1 to 400 for 10 minutes, drained, covered, and set away moist till 6 o'clock in the evening, when they should be spread out to dry overnight to be ready for planting the next day.

In planting, an allowance must always be made for the fact that there are fewer treated seeds in a bushel than there are of dry untreated ones. In general, it is recommended to sow about 25 per cent more bulk than is usual of the dry grain, otherwise fewer seeds will be actually planted and the yield will be reduced correspondingly.

The use of the presoak method tends to increase the efficiency of the disinfectant, in that the presoaking stimulates dormant bacteria and possibly fungi into vegetative activity, thereby rendering them extremely susceptible to the subsequent action of the disinfectant.

The general use of the presoak method of treatment in farm practice for other diseases involves no radical change in present procedure, the only deviation being to keep the seeds moist for a definite period before giving them the disinfectant treatment.

In applying the principles here utilized to other kinds of seeds, the determination of the lengths of the two parts of this method—(1) the presoak period, (2) the subsequent disinfectant treatment period—must be governed by the following factors: (a) the rate of absorption of water by the seeds, (b) the susceptibility of the seeds and pathogens to the disinfectant, and (c) the respective periods necessary for the beginning of seed germination and of vegetative activity of the pathogen. In no case must the presoak period be continued until seed germination begins. The length of time necessary for the seeds to absorb about 30 per cent of their weight of water is suggested as the length of the presoak period when not conflicting with the other factors involved.

The presoak method of treatment, as here formulated, is proposed as a basis for the reinvestigation of practical seed treatment for all seed-transmitted diseases of economic importance amenable to control by formalin and copper sulphate as a means of eliminating seed injury and at the same time increasing germicidal efficiency.

The Relation of Sulphur to Soil Acidity and to the Control of Potato Scab.—MARTIN, W. H., in *Soil Science*, Vol. 9, No. 6, pp. 393-408. Baltimore, Md., 1920.

During the summer of 1919, five field experiments were conducted at the New Jersey Experiment Station on different soil types. Commercial flour sulphur was used in amounts varying from 300 to 1,200 pounds per acre. The applications were made broadcast after the land was harrowed and just before planting. With due regard to the fact that the experiments were conducted for one year only, the author submits the following points:

With the different amounts of sulphur used, all gave substantial gains in the number of clean tubers. With the heaviest application, however, scab was not entirely eliminated. The results would indicate that with those varieties of potatoes known to scab severely the use of sulphur in the proper amount will render a large portion of the crop saleable.

In all cases, following applications of sulphur there was an increase in soil acidity as measured by the hydrogen-ion concentration of soil extracts. In most instances this increase in acidity, corresponding to a decrease in hydrogen-ion exponent, was in proportion to the amount of sulphur applied. With a decrease in hydrogen-ion concentration there was a decrease in the number of scabby tubers.

The necessity of knowing the soil reaction before sulphur applications are made is evident from the fact that where the hydrogen-ion concentration of water extracts of soil samples taken before the sulphur applications were made was 5.8 or less, the lighter applications (300 to 500 pounds) gave approximately as good control of scab as the heavier applications (700 to 1,200 pounds). Where the initial exponent was greater than 6.0 the heavier applications gave the best control.

The results of the present work would indicate that the limiting exponent for the growth of the scab organism is lower in soil than in culture media.

INJURIOUS INSECTS

A Serious Nematode Disease of Red Clover in the Northwestern States.—SMITH, R. H., in *Journal of Economic Entomology*, Vol. 12, No. 6, pp. 460-462. Concord, N. H., 1919.

The widespread destructiveness of an infection of red clover in Idaho during the autumn and early winter led to an investigation by the author in which the well-known stem and bulk nematode of Europe (*Tylenchus dipsaci* [devastatrix]) was found responsible.

The indications are that it has been present in southern Idaho for several years, and that it is rapidly increasing in its destructiveness. During the spring of 1919 several hundred acres of red clover had to be ploughed up, while a large percentage of the fields left was quite badly affected. This nematode was first recorded from North America by Bessey, who found it damaging a field of rye at Edgerton, Kansas, in 1907. It was next discovered in 1913 at Bellingham, Wash., where it caused serious injury to hyacinths, and in 1915 it was found injuring red clover at Redmond, Oregon.

The nematodes appear to enter the clover plants at the surface of the ground, first working into the stipules of the leaves which surround the developing stems and later entering the stems. The infested parts near the ground become enlarged, spongy, and finally turn brown and rot off. The worms also occur higher up in the stems

and in the leaves and branches, where they cause distortions and enlargements. The malforming of plants is most pronounced in autumn and early winter. During the summer the foliage of affected plants usually has an unhealthy, striped-yellow appearance, and the plants as a whole are more or less stunted.

The death of diseased plants is hastened in the greater number of cases by the work of secondary agents, the most important of which seem to be the root mite (*Rhizoglyphus rhizophagus*), the larvæ of the mycetophilid (*Sciara trifolii*), and the larvæ of *Sitones hispidulus*, a snout beetle that is common in clover fields in the Northwest. The great injury results to clover fields the second year or longer after seeding when both the nematodes and the insects are found to be more abundant. Several fields have been observed, however, which had to be ploughed up the first year after seeding.

AGRICULTURAL ECONOMICS

THE PRINCIPLES OF CO-OPERATIVE MARKETING AS ILLUSTRATED BY CALIFORNIAN EXPERIENCE

This article is a summary of a monograph by J. W. Lloyd, published by the University of Illinois.

Fundamental Principles of Co-operative Marketing.—The author formulates eleven fundamental principles on compliance with which depends the success of co-operative marketing, as illustrated by Californian experience.

1. *Organization for marketing purposes can be most readily effected when conditions in an industry are such that the need of improvement is quite generally apparent to those engaged in the industry.*—Prices below the cost of production, frequent "red ink" returns in the case of perishable products, accumulation of unsold products, depreciation of property values, and threatened financial disaster have been the conditions prevalent in the California citrus fruit, deciduous fruit, raisin, almond, and cantaloupe growers' industries prior to the organization of co-operative marketing.

2. *Unless at the time of organization the conditions in the industry are so unsatisfactory that striking improvements are possible early in the life of the organization, the organization itself is likely to die from inertia or succumb to attacks from outside interests.*—Growers who resort to co-operative methods for the marketing of their products are almost sure to meet with bitter, and often unscrupulous, opposition from those interests which previously handled the product to

their own advantage. In the face of such opposition success can only be achieved by unstinted thought and effort devoted to the affairs of the co-operative organization, which can only be expected when previous conditions were such that striking benefits may be expected from the co-operative effort.

3. *There must be a sufficient volume of one product or closely allied products represented by the membership of a local organization to enable shipments to be made in carload lots and to effect a sufficient aggregate saving in the cost of marketing to more than counterbalance the expense of operation.*—The principal volume of California's horticultural products must be placed on distant markets, and carload shipments are essential because of the wide difference in freight rates on carloads and less-than-carloads. To be successful, the loading of a car of perishable fruits must be effected at the point where shipment originates. The volume of business should be sufficient to permit the economical employment of labour and salaried officials.

4. *The organization must be composed of persons whose interests are similar. Membership in a growers' organization should usually be limited to actual growers of the crop to be marketed.*—Experience shows that this is fundamental. Not only should each growers' co-operative marketing organization handle only one product or a few closely allied products, but each unit of

organization should be composed of persons living within a limited area. The quality and finish of a product is more likely to be kept up to a certain standard if the growers live in the same community. The concentration of orange growing in certain regions has been one of the facts which have contributed to the success of the California Fruit Growers' Exchange. Attempts hitherto made to combine in one organization the interests of growers and commercial packers or dealers have demonstrated the incompatibility of such an arrangement.

5. *Definite provision must be made for financing the business of the organization.*—With this end in view, various means of securing funds have been employed. In the citrus industry, the local associations have been organized as joint-stock companies in which each member is required to purchase a certain amount of stock for each acre of his orchard. But this has had to be supplemented, to meet initial expenses, by securing a loan from the local bank. Experience shows that if sufficient funds to finance a given organization cannot be secured from subscriptions of growers on the basis of acreage or volume of produce, or borrowed from banks, and the issuing of shares of stock on other than an acreage or volume basis becomes necessary, the sale of such stock should be transferable only to growers, and the amount of stock which may be owned by an individual should be limited.

6. *Benefits accruing from membership in the organization should be distributed among the members in proportion to the value of the products handled for each.*—When stock in a growers' co-operative marketing association has been purchased by members in proportion to their respective acreages or volume of products, it makes little difference whether profits are distributed on the basis of the holding of each member in shares of capital stock or on the basis of the volume or value of products handled for each; still, even then, it is preferable to make such distribution on the basis of the value of the products handled, as this encourages not only the production of higher yields but also of high grade products.

7. *In a properly constituted growers' co-operative marketing organization it makes little difference whether the voting power is based upon individuals, volume of product, or shares of stock.*—The most desirable form of organization is that in which shares of stock, if any, are held by the growers in proportion to their acreage or volume of product. A vote based on such shares of stock is essentially the same as a vote based on volume of product.

8. *For the purpose of marketing the product of a large horticultural industry, an affiliation of local organizations is preferable to a single large organization made up directly of individual growers. In such an*

affiliation, the identity of each local should be preserved and its interests fully represented in the central organization.—Experience shows that the members of the various locals should be represented on a central organization, which should meet at fairly frequent intervals.

9. *Each organization must possess a degree of administrative ability and business acumen commensurate with the volume of the business to be transacted and the intricacy of the problems to be solved.*—Experience has shown that, in respect of this important fundamental, co-operative marketing enterprises which develop as the result of initiative on the part of the growers themselves have the advantage over those resulting from the efforts of a professional organizer from the outside, for the former will possess among their membership the organizing ability requisite for success. But these members, being growers, will as a rule, be unable to devote more than a fraction of their time to the affairs of the organization; much will therefore depend on the selection of a manager; and the poorest economy which an organization can make is that of securing a cheap manager. For this position specific training in the handling of a given commodity is found to be of less importance than knowledge of men and of marketing methods and trade conditions in general.

10. *The details of handling, selling and distributing the crop must be adapted to the nature and volume of the products.*—Thus, while for some products, such as beans, almonds, dried raisins, prunes or citrus fruits, the association can do the packing at considerably less expense than could an individual grower, with other products, such as berries, melons, and those deciduous fresh fruits which are shipped most extensively during hot weather, and which deteriorate rapidly, association packing is impracticable because of the delay it would entail in getting the product from the field to the car.

11. *Loyalty of individual members and mutual confidence among all factors in the organization are absolutely essential to the permanent success of any co-operative enterprise.*—This is the outstanding feature of all success in co-operative effort, and its importance has been fully recognized by co-operative marketing organizations in California. Personal contact between growers and local managers, and between these and the members of the field department have been carefully cultivated. Efforts are made to induce growers to attend the annual stockholders' meetings. The California Fruit Growers' Exchange keeps its 8,000 members in personal touch with the activities of the organization as a whole, and makes its representatives in the eastern markets realize their function as parts of one great organization working to achieve the best possible distribution of the

California citrus fruit crop, and to this is attributed its present efficiency in the marketing of this product.

Advantages of Co-operative Marketing.—The author classifies the advantages of co-operative marketing under five heads. Illustrations under each of these headings are given from the experience of the growers of California:

(1) reduction of the cost of marketing; (2) improvement in the distribution of the product; (3) increased demand for the product; (4) standardization; (5) protection of the individual grower.

After this survey of the fundamental principles of co-operative marketing and its advantages, the author briefly enquires into the relation of such organizations as he has described to the control of production, distribution and prices.

CONTENTS OF THE INSTITUTE ECONOMIC BULLETIN

In addition to those already dealt with herein, the following is a list of the more important subjects treated in the April and May numbers of the International Review of Agricultural Economics. Persons interested in any of the articles in this list may obtain the original bulletin on application to the Institute Branch, so long as the supply for distribution is not exhausted.

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AGRICULTURAL STATISTICS

THE CROPS OF 1920

Countries	1920	1919	Five years' average 1914-18
	bushels	bushels	bushels
WHEAT:			
Belgium.....	9,050,000	9,895,000	7,935,000
Spain.....	134,457,000	129,251,000	137,221,000
Finland.....	276,000	306,000	231,000
Italy.....	146,975,000	169,771,000	167,991,000
Switzerland.....	3,586,000	3,524,000	4,205,000
Canada.....	289,498,000	193,260,000	248,084,000
United States.....	770,000,000	940,987,000	822,246,000
Guatemala.....	312,000	252,000	632,000
India.....	376,880,000	280,485,000	352,837,000
Algeria.....	13,902,000	19,166,000	33,191,000
Egypt.....	27,246,000	30,137,000	34,186,000
Morocco.....	17,472,000	.....	18,654,000
Tunis.....	4,766,000	6,981,000	7,047,000
Totals, less Morocco.....	1,776,948,000	1,784,015,000	1,815,806,000
RYE:			
Belgium.....	16,113,000	13,681,000	11,092,000
Spain.....	32,053,000	23,297,000	26,696,000
Finland.....	8,681,000	10,505,000	9,137,000
Italy.....	4,724,000	4,571,000	4,931,000
Switzerland.....	1,621,000	1,575,000	1,676,000
Canada.....	12,915,000	10,207,000	3,948,000
United States.....	77,900,000	88,478,000	59,933,000
Totals.....	154,007,000	152,314,000	117,413,000
BARLEY:			
Belgium.....	4,331,000	3,617,000	10,048,000
Spain.....	89,146,000	81,371,000	82,071,000
Finland.....	5,535,000	5,295,000	4,522,000
Italy.....	5,971,000	8,327,000	9,037,000
Switzerland.....	620,000	625,000	617,000
Canada.....	64,257,000	56,389,000	53,067,000
United States.....	195,000,000	165,719,000	214,819,000
Algeria.....	13,857,000	25,538,000	40,108,000
Egypt.....	7,475,000	10,087,000	12,296,000
Morocco.....	30,217,000	.....	32,143,000
Tunis.....	3,169,000	5,512,000	7,918,000
Totals, less Morocco.....	389,361,000	362,480,000	434,503,000
OATS:			
Belgium.....	28,550,000	25,337,000	.....
Spain.....	37,294,000	30,979,000	30,847,000
Finland.....	25,969,000	22,714,000	22,881,000
Italy.....	25,288,000	32,654,000	30,793,000
Switzerland.....	2,931,000	2,607,000	4,575,000
Canada.....	556,719,000	394,387,000	403,513,000
United States.....	1,442,000,000	1,248,310,000	1,414,558,000
Algeria.....	4,863,000	10,008,000	14,495,000
Tunis.....	1,427,000	2,918,000	3,046,000
Totals, less Belgium.....	2,096,491,000	1,744,577,000	1,924,708,000
CORN:			
Switzerland.....	280,000	287,000	209,000
United States.....	3,131,000,000	2,917,450,000	2,760,484,000
Guatemala.....	4,062,000	4,939,000	9,398,000
Morocco.....	2,858,000	.....	3,854,000
Tunis.....	197,000	256,000	229,000
POTATOES:			
Belgium.....	79,407,000	76,065,000	.....
Finland.....	19,199,000	17,718,000	17,674,000
Canada.....	123,776,000	125,575,000	72,712,000
Switzerland.....	28,256,000	27,925,000	28,219,000
United States.....	413,000,000	357,901,000	382,113,000
Guatemala.....	96,000	694,000	.....

The figures in the above tables are all official as furnished by the International Institute of Agriculture. Only those countries are given which have so far sent to the Institute their estimates for 1920.

Referring to the table at page 719 of the Agricultural Gazette for August, in which estimates, official and otherwise, for wheat are given, it will be noted that the only important changes are in the cases of the United States, Spain and Algeria. The 1920 estimate for the United States is decreased by 39,000,000 bushels; that of Spain by 10,000,000; and that of Algeria by 4,000,000,—a total decrease of 53,000,000 bushels. The world's totals will therefore read 2,833,000,000 bushels for 1920, against 2,752,000,000 in 1919, and a pre-war five years' average (1909-13) of 2,824,000,000 bushels.

FOREIGN CROP CONDITIONS

(From the International Crop Report and other sources.)

Europe—From the somewhat vague indications early in September the agricultural prospects in Europe are not so satisfactory as in ordinary times. No authentic reports relative to the great wheat producing areas of Russia are available.

Quantitative estimates are as yet not available from the majority of European countries, those available are given in the above table.

In Jugo-Slavia and Czecho-Slovakia prospects were excellent. In Belgium the prospects were very good. The harvest in France was hindered somewhat by rain and labour shortage. The crops of the United Kingdom suffered from drought and cold winds, but the appearance of wheat was good. In Roumania the yields are good with the probability of some wheat being exported. The prospects of cereal crops in the Netherlands range from five to fifteen per cent above the average. In Germany threshing returns were reported to be disappointing.

India—Crop conditions were generally good but more rain was needed in parts. A partial lifting of wheat export restrictions was expected.

Argentina—Early in September the weather was continuing dry and was hardly favourable for the growing crops.

Australia—Most optimistic reports continued to come from this country, and a very large crop was expected. The total wheat area is estimated at 11,600,000 acres against 7,400,000 last year.

IMPORTS AND EXPORTS OF WHEAT AND FLOUR

(Flour expressed in equivalent quantities of wheat)

(Thousands of Bushels)

Countries	Imports				Exports			
	June		First 6 months, Jan. 1 to June 30.		June		First 6 months, Jan. 1 to June 30.	
	1920	1919	1920	1919	1920	1919	1920	1919
Belgium.....	3,262		15,713	322	78	4	189	4
Denmark.....	37	3	961	118	2	1	89	435
Finland.....	189		1,519					
Great Britain and Ireland.....	20,513	17,041	103,566	76,941	16	28	206	191
Greece.....	1,630	836	7,251	3,495	7	11	234	29
Italy.....	5,966	13,984	38,204	46,105	130	98	1,331	453
Netherlands.....	2,338	1,683	10,455	9,601	57		427	243
Poland.....	167							
Roumania.....			49	7,995			10	
Sweden.....	1,440	351	4,621	1,391				56
Canada.....	22	1	111	29	7,949	11,612	39,015	53,882
United States.....	460	1,908	3,617	45,047	21,753	32,652	101,065	148,382
Argentina.....					28,602	12,111	165,175	33,940
India.....		30	7	6,271	229	160	1,722	913
Algeria.....	92	8	206	55	87	864	365	5,919
Australia.....					5,054	6,249	46,695	50,318

WORLD'S SILK PRODUCTION

The annual estimate of raw-silk production of the world, compiled by the Union of Raw Silk Merchants of Lyon, France, shows for 1919 a decline of 3,430,500 pounds from the production of the preceding year and of 6,239,100 pounds from that of 1917, the associations figures for these three years being :

Countries	1917	1918	1919
	Pounds.	Pounds.	Pounds.
WESTERN EUROPE :			
France.....	452,000	529,100	407,900
Italy.....	6,217,000	5,941,500	4,078,600
Spain.....	154,300	165,400	154,300
Austria.....	187,400	187,400	165,300
Hungary.....	143,300	143,300	110,200
Total.....	7,154,000	6,966,700	4,916,300
LEVANT AND CENTRAL ASIA—FAR EAST			
China (Shanghai).....	10,097,200	10,738,700	8,598,000
China (Canton).....	5,169,800	3,637,600	5,070,600
Japan.....	34,050,400	32,308,800	32,187,500
India.....	231,500	242,500	220,500
Indo-China.....	11,000	11,000	11,000
Total.....	49,559,900	46,938,600	46,087,600
Grand Total.....	59,006,700	56,198,100	52,767,600

LIVE STOCK STATISTICS

FRANCE

Classification	Number on			Increase (+) or decrease (—) in 1919 as compared with 1918	
	31 Decem- ber 1919	31 Decem- ber 1918	31 Decem- ber 1914	In number	Per cent
Horses.....	2,413,190	2,232,930	2,205,192	+180,260	+ 8.1
Asses.....	303,100	311,890	336,714	— 8,790	— 2.8
Mules.....	167,180	139,070	151,709	+ 28,110	+20.2
Cattle.....	12,373,660	12,250,820	12,668,243	+122,840	+ 1.0
Swine.....	4,080,560	4,377,020	5,926,291	—296,460	— 6.8
Sheep.....	8,990,990	9,061,110	14,038,361	— 70,120	— 0.8
Goats.....	1,166,770	1,197,490	1,317,155	— 30,720	— 2.6

The number of horses have increased 208,000 since 1914 and 180,000 over 1918. Cattle have remained about stationary. Swine have decreased by over 1,900,000 since 1914, and sheep by 5,000,000.

BESSARABIA

Classification	1919	1918	Increase (+) or decrease (—)	
			In number	Per cent
Horses.....	402,679	416,608	— 13,929	— 3.3
Cattle.....	654,881	549,569	+105,312	+19.2
Sheep.....	1,593,925	1,434,587	+159,338	+11.1
Goats.....	15,714	15,496	+ 218	+ 1.4
Swine.....	345,778	400,337	— 54,559	—13.6

THE INTERNATIONAL YEAR BOOK OF AGRICULTURAL STATISTICS, 1909-1918

The International Institute of Agriculture has just published, through its Bureau of General Statistics, its fifth year book of agricultural statistics, for 1917 and 1918. A large volume of over 700 pages containing the most complete existing series of statistical data connected with agriculture for almost all countries, free states, and colonies in the world. This volume is of the greatest interest to politicians, economists, agriculturists, traders and all who are interested in the factors determining prices and distribution of agricultural products. It supplies in a systematic form for all countries having statistics the data on yield, trade, consumption and prices of the chief agricultural products during the whole decennial period from 1909 to 1918 for the Northern Hemisphere and to the first half of 1919 for the Southern Hemisphere. This is the last world year book to deal with States according to the political frontiers of pre-war times, and therefore some States which have now disappeared as a consequence of the effects of war appear in it for the last time, whereas newly constituted states are as yet lacking from the volume.

In particular the material contained in this Year Book comprises the following data:

(1) The latest statistics on territorial area and population for all countries in the world.

(2) The distribution of the territorial area for agricultural purposes in about 40 countries.

(3) The area, yield, and yield per hectare of the crops during the ten years 1909-1918, viz., cereals (wheat, rye, barley, oats, maize and rice), potatoes, sugar beet and cane, sugar, grapes, wine, olive oil, coffee, tobacco, hops, cotton, flax (seed), rape, mulberry leaves and silk-worm cocoons. For each product there are given the averages for the two quinquennia and the decennial average for the period considered, as well as recapitulation tables of total areas and yields. Finally tables are given for the more important products showing the proportional distribution of the latest average five-year yields among the different producing countries, so as to bring out the importance of each country's yield compared with the average world yield.

(4) The latest live-stock census data, with yearly statistics for the ten years 1909 to 1918, for about a hundred countries. These data are compared with the population and productive area figures, so that the comparisons become of the greatest interest to those working on problems inherent to feeding for meat production.

(5) and (6) Trade.—These two sections deal with the trade in agricultural products the first furnishing data on imports, exports and re-exports for the calendar years 1909 to 1918, not only of the products considered in part 3 but also of tea, cocoa and rubber; the latter section furnishing for cereals only the data by commercial seasons, from August to July every year, and showing in detail the monthly movement in importing and exporting countries.

(7) Consumption.—The tables in this section deal with the consumption of cereals and give a comparison for each country of the averages calculated by the Institute for the two five-year periods before the war with those furnished by the Governments for the seasons 1916-17 and 1917-18.

(8) Prices.—This section shows the prices on a fixed day every week during the years 1917 and 1918, the spot and future prices for the chief agricultural products on the most important international markets, and then the average monthly prices in each country for these products and live stock during the ten years 1909 to 1918.

(9) Rates of ocean freight.—For each week of the period 1912 up to 1918 there are shown for the chief routes from exporting countries the rates of ocean freight for wheat and maize, expressed in gold francs per metric ton.

(10) Exchange rates.—The section dealing with the exchange rates for each week during 1917 and 1918 serves as a necessary complement to the data contained in the two preceding sections on prices and ocean freight rates.

(11) Chemical manures.—This last section comprises all available figures on the production, trade and prices of chemical manures.

(12) The volume ends with a collection of notes in which the authorities for each country whence data were taken, any anomalies encountered in the various statistics, coefficients of reduction adopted by the Institute in reducing to a homogeneous form the data are, indicated. The fullness and accuracy of the information on authorities is to be noted, as this part constitutes an interesting bibliography, almost unique in its kind.

The Year Book is on sale at the price of 15 francs, from the International Institute of Agriculture (Villa Umberto I, Rome) and from the principal booksellers, to whom remittances should be made by cheque or International Money Order.

The Year Book is published in the French language only, but there is an index in English which gives the translation of the headings of the tables.

EDITOR FOR THE DEPARTMENT OF AGRICULTURE

The resignation of Mr. J. B. Munro, Assistant Editor of the Agricultural Gazette, has created a vacancy in the Department of Agriculture. The Canada Gazette of September 25th contains an advertisement of the Civil Service Commission for an officer with the rank of Editor to fill this vacancy. The advertisement in relation to this position, reads as follows:

Editors.

1485. Editors at an initial salary of \$1,800 per annum, which will be increased upon recommendation for efficient service at the rate of \$120 per annum, until a maximum of \$2,160 has been reached. This initial salary will be supplemented by whatever bonus is provided by law.

Duties.—To receive, arrange, and edit manuscripts for publication; to supervise the printing of reports, bulletins, minutes of proceedings, and other government publications; to give instructions to the printer on make up, type, and other technical details; to read proof, to prepare mailing lists and supervise the distribution of printed material; to handle correspondence; to furnish information and prepare statistical data for the use of a department or for Parliament; to prepare tables of contents and indexes, write occasional articles, and do writing incident to editing; and to perform other related work as required.

Qualifications.—Education equivalent to graduation from a university of recognized standing; at least two years of experience in preparing manuscript and proof for the printer; knowledge of printing and illustrating processes; ability to handle correspondence and compile ordinary statistical information; discrimination and good judgment. While a definite age limit has not been fixed for this competition, age may be a determining factor when making a selection.

Examination.—Subjects and weights as follows:—Education and Experience, 2; Practical Questions, 2; Oral Interview, if necessary in the opinion of the Commission, 1.

A list of eligibles will be established for vacancies in the above class throughout the Dominion, but the only vacancy required to be filled at present is Editor, Publications Branch, Department of Agriculture, Ottawa. This particular appointee must have ability to edit official agricultural periodicals. Persons qualified are urged to take part in this competition, in order to become eligible for future vacancies in this class.

General Directions.

According to law preference is given to persons who have been on active service overseas on the military or naval forces of His Majesty, or any of the Allies of His Majesty, during the late war.

Application forms properly filled in must be filed in the office of the Civil Service Commission not later than 14th October. Application forms may be obtained from the office of the Employment Service of Canada, or from the Secretary of the Civil Service Commission, Ottawa.

By order of the Commission.

W. FORAN,
Secretary.

Ottawa, September 16, 1920.

Vol. 7: No. 11



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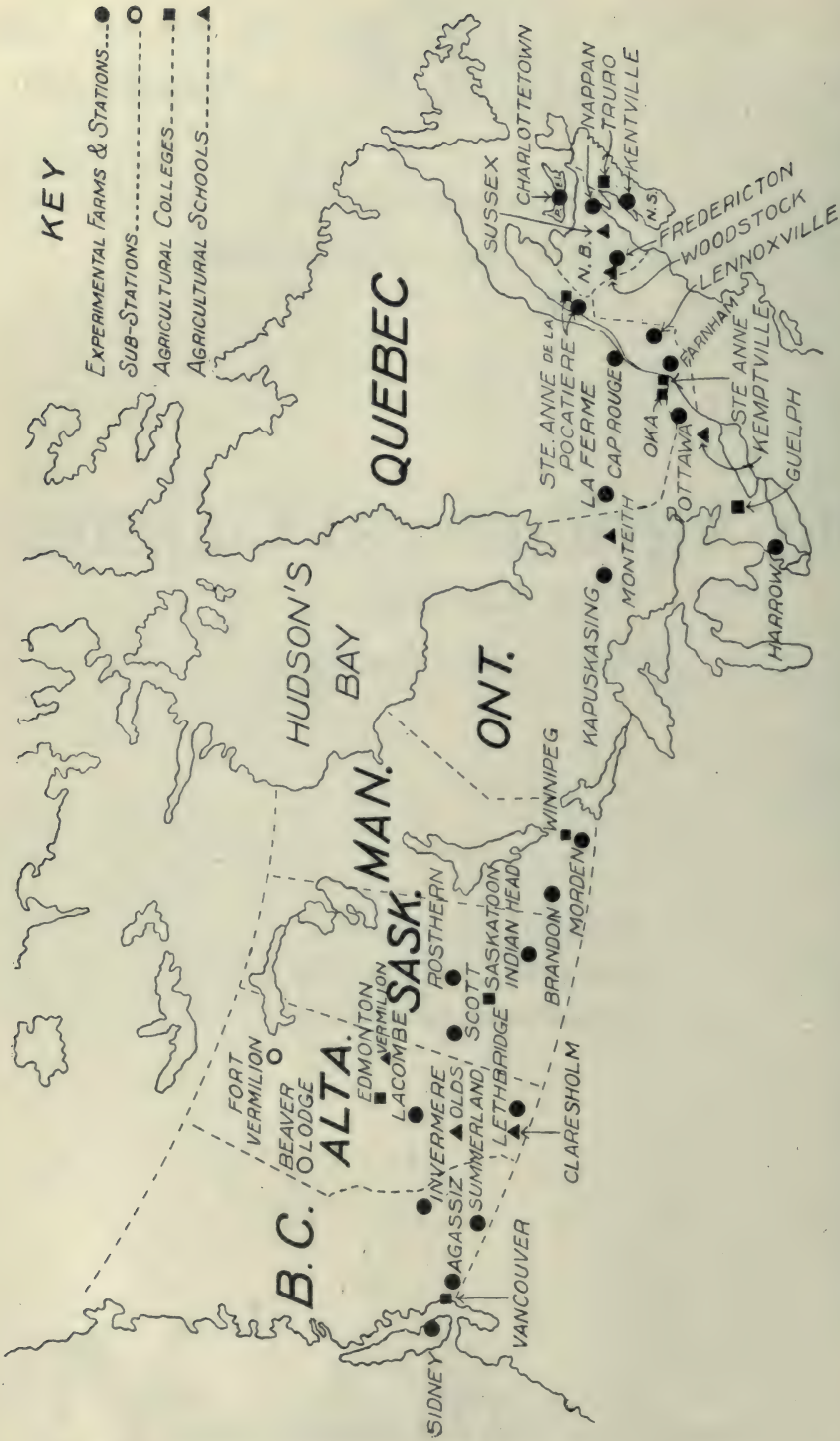
DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE

The Agricultural Gazette of Canada

EDITOR: J. B. SPENCER, B.S.A.

Issued by direction of
THE HON. S. F. TOLMIE
Minister of Agriculture

OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920



MAP OF CANADA SHOWING THE LOCATIONS OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

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Subscriptions should be forwarded to the Editor, Agricultural Gazette, Ottawa.

FIBRE FROM THE STRAW OF FLAX

INVESTIGATIONS commenced by the Saskatchewan Grain Growers' Association to determine the possibilities of recovering and utilizing straw from flax grown for seed production, have been continued by the Federal Department of Agriculture. The objects of this work were to ascertain the value of the conclusions reached in previous investigations, to discover some means of deseeding the western flax straw without materially injuring the fibre, and to obtain cost figures on the various processes in the utilizing of the fibre into cordage, felt, twine, and other products. The investigations included a comparison between matured straw and straw frozen before maturity. The conclusions drawn in regard to these qualities were that green straw could not be decorticated, and that fully matured straw was slightly better than almost mature frozen straw for fibre production. The fibre ultimately obtained was chemically treated in specially prepared vats by a fermentative process, which require only a few hours. After thus being treated, the fibre was shipped to a cordage factory where it was carded, twisted, scrubbed, and baled into binder twine. The twine has not been tested sufficiently under field conditions to justify a pronounced statement. It was 4-ply twine running 650 feet to the pound, and was reported to have a tensile strength of about 45 pounds. Commercial twine and rope were also made, but definite conclusions regarding their value have not been established. Waste material was found useful for felting purpose, and when mixed with 20 per cent of cow hair, it could be used for insulating. In these experiments, 77 tons of flax straw taken from 173 acres gave $17\frac{1}{2}$ tons of raw fibre, which when further refined produced 347 bales of 90 pounds each of treated fibre. From 123 of these bales there was manufactured 5,987 pounds of cordage. With regard to the cost of production it has been worked out that one ton of straw of seed producing flax will give 249 pounds of binder twine and 142 pounds of felting material, and that the binder twine was manufactured by the process followed at a cost of 13.54 cents per pound, and commercial twine for 20.54 cents per pound. These figures, it may be stated, do not take into consideration what may be regarded as overhead charges or capital expenditure, nor can they be considered conclusive.

MUNICIPAL HAIL INSURANCE IN SASKATCHEWAN AND ALBERTA

THE Saskatchewan Municipal Hail Insurance Act, 1920, includes several important changes but none of them affect the general principle of previously existing law contained in the Act of 1917. It provides a system of mutual insurance under which rural municipalities may co-operate to tax each other to provide compensation for hail losses.

The Hail Insurance Association, an incorporated body created by the Act of 1917, is continued. It consists of one delegate from each municipality in the province which has come under the scheme by a majority vote of its ratepayers at the annual municipal elections. There is a board of nine directors, who hold office for three years. They are elected at the annual general meeting of the association, three retiring each year. Directors need not be delegates. The directors elect from their own number a president and a vice-president, who with one other member of the board, constitute the executive committee. They appoint a secretary-treasurer who need not be a director.

Land in the municipalities under the scheme is assessed at 4 cents per acre together with an additional rate per acre fixed annually by the directors to be levied on land of an owner or occupant under crop in excess of forty acres. Every person liable to assessment under the Act must, by the first of June each year, make a report to the secretary-treasurer of his municipality giving a legal description of his land and the number of acres under crop. Failing such a report the facts are ascertained by an official and his declaration binds the owner or occupant.

Any person may withdraw from the operation of the by-law by giving notice to the secretary of the association before June 1st, and the land withdrawn remains so for a period of

at least one year and until upon an application the board directs that it be again brought under operation of the by-law. A new provision in the Act of 1920 enables the owner of a crop destroyed by grasshoppers, drought, or in any other manner than by hail, to withdraw such crop from the operation of the by-law by giving notice before July 20th and to receive a refund of a proportionate amount of the premium he has paid.

Crops are insured against damage from hail from June 16th to September 15th. The owner of a crop which is damaged must within three days give notice to the secretary of the association. An inspector then inquires into the claim and reports.

Each claimant is entitled to receive not more than five cents per acre for every one per cent of damage from hail he has sustained. When a crop is damaged less than five per cent no indemnity is due. Damage throughout the same season and upon the same area is treated as cumulative.

Working of the Act.—The number of claims received in 1919 was 7,838, and the total indemnity paid for loss, \$1,911,776. The directors levied 22 cents per acre on the crops of each farmer in excess of 40 acres, besides the 4 per cent flat rate. The total revenue from assessment was \$2,190,909, and the expenses of the Association amounted to \$60,732. The total number of storms for which inspection had to be made was 55. The heaviest and most disastrous losses occurred on July 1st, the total claims paid for that date alone amounting to \$1,100,000. In previous years the most serious losses occurred between July 15th and August 10th. The heaviest damage was done in municipalities which had not in the past been looked upon as dangerous hail districts, proving again that hail storms do not follow a beaten path.

The directors of the Association have estimated the total losses in Saskatchewan from damage by hail in 1920 at \$800,000. They have decided to levy an excess rate of 12 cents per acre in addition to the 4 cents flat rate, a reduction of 10 cents per acre from the assessment of 1919. The heaviest losses this year were experienced during the big storm of August 4th.

ALBERTA

In 1912 the farmers of Alberta were instrumental in having passed the hail insurance clauses of the Rural Municipality Act. Under these clauses a hail insurance district was formed in 1914. It was later decided that the plan should be changed to make it acceptable to farmers generally and to extend it to cover the whole or greater part of the province. Consequently the Municipal Hail Insurance Act, 1918, was passed. This Act was amended by chapter 19, of the Statutes of 1920. It applies to that portion of the province of Alberta south of the North Saskatchewan river and to a block of land containing approximately 3,500 square miles north of the river.

Municipal districts within the area to which the Act applies, are brought under the Act by a favourable vote on a by-law submitted to the electors. The municipal districts brought under the Act constitute the hail insurance district which is under the direction of a board of nine members known as "The Hail Insurance Board of Alberta," with head office at Calgary. The board is elected by representatives of the municipal districts included in the hail insurance district, three members to be elected every year and to hold office for three years. The board may appoint a manager and will have full power to pass by-laws and make such regulations as may be necessary for carrying on the business of the district. The chairman of the board may receive a salary and the other members will receive \$8 per day and

cost of transportation and subsistence while attending meetings.

Every person owning land in the hail insurance district is required to report to the secretary-treasurer of his municipal district on or before June 15th in every year the acreage of the land owned or occupied by him, the acreage and location of each crop sown and the amount of insurance per acre desired, which may be six, eight or ten dollars per acre. If the insured crop is damaged by hail before the report is made by the owner, the maximum indemnity for total loss is six dollars per acre. No liability for indemnity exists when the damage done is less than 5 per cent of the portion of crop injured.

All crops of wheat, oats, barley, flax, rye and speltz are insured from June 15th to September 15th and fall wheat and rye from June 1st to September 15th.

Any owner or occupant may withdraw any portion of his crop from the operation of the Act by giving notice to the secretary-treasurer of his municipal district before June 16th in any year. Any land so withdrawn shall remain withdrawn until application is made to have it reincluded. When a crop insured is destroyed from any cause other than hail, the owner may at any time on or before July 20th withdraw such crop from the operation of the Act and obtain a proportionate rebate of the premium.

Notice of loss must be given to the board at Calgary within three days of date of storm. The adjuster is instructed to inspect the crop as soon as possible. He must make every effort to make an adjustment that is fair and satisfactory to the claimant and secure his written acceptance of the award if possible. If the claimant is not satisfied with the award he may appeal to the board which is bound to hear any further evidence in the case and may vary or confirm the report of the adjuster as it may deem proper.

The premium for hail insurance will be levied on the crop area only, at so much per acre, and will not be levied until after September 15th, when the losses of the year have been ascertained. The board has authority to levy a rate sufficient to pay the costs of administration, the losses in full for the year, and also to create a surplus for the year of not less than ten, nor more than twenty, per cent of the losses for that year.

As soon as the rate per acre is fixed by the board, the secretary-treasurer of each municipal district is notified of the rate and the total amount due from his municipal district. The tax is then levied on all the cropped area in the municipal

district except on lands withdrawn from the operation of the Act.

Working of the Act.—On June 15, 1919 the value insured in Alberta under the municipal hail insurance scheme was about \$16,000,000. Drought, cutworms, and other causes led to the withdrawal of about 500,000 acres from the scheme before July 20th, so that the value which remained insured throughout the season was about \$12,000,000. The total losses for the year amounted to \$506,000 or slightly more than $4\frac{1}{2}$ per cent, as against a little more than $2\frac{1}{2}$ per cent in 1918. The premium was fixed by the board at Calgary at 6 per cent, provision being made for the payment of all benefits in full, for the payment of expenses, and for a surplus of about \$100,000.

NOTE—Hail insurance is carried on in Saskatchewan and Alberta by private companies as well as by the government under municipal hail insurance. Most of the companies are fire insurance companies. Some of them do a general business, while a small number do hail insurance only. In the province of Saskatchewan alone there are some thirty-six companies underwriting hail insurance. The losses paid by these companies this year approximate \$1,750,000, which is about forty-two per cent of the premium incomes of the companies.

EDITOR.

"A co-operative enterprise is directly dependent for its success upon the loyalty of the members and their interest in the organization. Lack of loyalty and interest on the part of the members has resulted in the downfall of many co-operative associations. Organizations founded upon a real desire of the members are less likely to suffer from lack of allegiance than those which have for their basis misconceptions and prejudice."

PART I

Dominion Department of Agriculture

EXPERIMENTAL FARMS

DIVISION OF ANIMAL HUSBANDRY

FEDERAL EXHIBITS IN THE SHOW RING

BY GEO. B. ROTHWELL, B.S.A., DOMINION ANIMAL HUSBANDMAN

THE first entry of Experimental Farms Branch stock in open competition was made by the Experimental Farm at Agassiz, B.C., in 1918, the main exhibit being Holstein cattle at Vancouver. During the same year the Indian Head Farm exhibited Clydesdales at Regina, and The Brandon Farm showed Shorthorns, Clydesdales and Yorkshires at the Brandon Fair. The quality of the stock caused considerable comment in all cases, for while the entries from the Farms were light in numbers, the quality was such as to annex not only a considerable number of first places but also grand championships.

In 1919 the same western Farms competed and in the east the stations at Fredericton and Nappan entered the ring at the Maritime Winter shows.

During the present year the idea has been expanded still more. The western Farms mentioned have continued exhibiting with marked success. The Experimental Station, Lacombe, Alta., in addition, exhibited at Calgary. In Quebec the Stations at Cap Rouge and Ste. Anne de la Pocatière exhibited at Quebec, where the former Station was responsible for possibly the finest line up of French Canadian horses ever shown in Quebec. In the Maritime Provinces the Charlottetown Station made a most satisfactory showing in Ayrshires at the Charlottetown Fair.

The Central Farm at Ottawa competed in 1920 with Ayrshires, Clydesdales, beef cattle, sheep, and swine at the Ottawa Winter Fair; with Ayrshires and Clydesdales at the Canadian National, Toronto, and with Ayrshires, Clydesdales, beef cattle, and sheep at the Central Canada Exhibition, Ottawa. Without attempting any recapitulation of winnings mention might be made of the winning by the Central Farm of the junior and grand championship in Ayrshire bulls at Toronto and Ottawa, also 1st prize Ayrshire cow in milk; and what is perhaps most encouraging, the capturing of first place in several herd, group and progeny classes, besides a large number of firsts on individuals.

HAS IT BEEN WORTH WHILE

Naturally, more or less adverse criticism has been directed toward these activities in the show ring. This has been much less than expected and has not been directed from the most weighty sources. Rather, to the contrary, the breeders have welcomed any "boosting" of their breeds which may have resulted, claiming that, for the Farms System, the best should be none too good. Also there is no uncertain evidence of the fact that many people have appreciated for the first time the fact that the

Experimental Farms not only actually exist, but that they are able to maintain a creditable standing in high-class open competition.

THE PRESENT POLICY

Policy 1.—That the showing of Experimental Farms stock in open competition should not be regarded as a permanent feature. In other words that no Farm should compete year after year in any special class or breed or show regularly at all, for that matter. Rather, that special effort should be directed, if possible, to a different class of stock each year or every few years, depending, of course, upon the breeds and classes of stock maintained.

Policy 2.—That, so far as possible, home bred stock be exhibited with the possible exception of sires and imported or high class foundation stock, but that no effort whatever be made toward buying individuals with the primary object of show in mind.

Policy 3.—That for the present Experimental Farm stock be entered in open competition pending such time as special government institution classes be made a feature. Should such provision be made, Farms stock would naturally not come into open competition except in the championship, sweepstakes or open classes.

FUTURE PLANS

The foregoing policy indicates no hard and fast future plans. Freedom to exhibit is desired. No regular schedule is to be followed. It is hoped, however, to exhibit in the United States also, at such large Shows as the International and the National Dairy Show at Chicago. It is felt that Canadian interests could in no wise suffer through a creditable showing of Canadian Government stock at some of the greatest stock shows in the world.

THE PEOPLE'S STOCK

There is, and always has been, a peculiar misconception with reference to government owned farms and institutions in general. They are not a thing apart from the people, but something entirely owned by the people. Government owned stock in the prize ring is the people's own property in competition. If the quality is poor then someone is neglecting the people's property; if the entries can top the classes, there is the best kind of evidence right in the spotlight of publicity that the public are at least being supplied with the proverbial "run for their money." There is the fact that competitors are thus contributing, as it were, to their own defeat. The broad minded farmer, however, who visits our fairs and exhibitions should feel a certain proprietary interest in following the vicissitudes of the people's horse and cow in the show ring.

SATISFYING THE BREEDERS

Then there are the various breeders' associations to be considered,—associations that have demanded that the best of the breeds concerned be maintained on the various Farms of the System. How and where can these associations be better convinced that this attention is being given than by subjecting these breeds to open competition? It is worthy of note that several associations have not only expressed themselves as agreeable, but have actually suggested such a course of action. The exhibition of good stock of any breed, whoever the owner may be, is the most potent kind of advertising for that breed.

ADVERTISING VALUE

The ultimate value of successful showing of live stock to the private individual is from the advertising which he and his animals so obtain.

There is no institution which strives harder to reach the public than does the Experimental Farms Branch. The fact that government owned studs, herds and flocks can win recognition in the highest company is a powerful advertising factor. The winning of one breed championship is worth several years of reports and bulletins *in getting the people's attention*. This is not theory only. Every successful exhibiting Farm and Station has had direct evidence of the advertising value of show ring activities. The interested public is given to know that its Farm System is, in a live-stock sense,—on the map. The value of the Farm or Station has been enhanced. To stand up well in competition means good foundation stock and careful breeding and fitting.

AN INCENTIVE TO BETTER EFFORT

Just how valuable an incentive the lessons of the show ring are to the men in charge of live stock matters on the Farm System, is difficult to calculate. From the brick-bats and bouquets, the Superintendent gets a very clear idea of his standing in certain phases of the live stock industry. This standing, whatever it may be, he strives to maintain, or improve, and his staff are similarly affected.

CRITICISM

The most favoured line of criticism against this policy is that the government institution has unlimited funds for the purchase, breeding, and fitting of show stock, as against the limited resources of the private breeder. Any one familiar with actual conditions knows full well that there are

no more careful buyers than those who invest the funds of the various divisions of work of the Dominion Experimental Farm System. They have no alternative. The majority of the individual government entries which have recently won high honours in Canadian show rings have been home bred. Those that have been purchased have been obtained at prices extremely low, quality considered.

MAINTAINING A STANDARD

The intermittent feature of the policy presently chosen permits of two distinct claims, (1) the maintenance of a standard, or the standardizing occasionally of Farm herds and flocks to the show ring type; (2) the prevention of any resentment or discouragement in the case of other breeders.

In conclusion, even should the showing of live stock in open competition be discontinued, the actual benefit derived by the Experimental Farms from the past two or three years' work, is incalculable. It is hoped, too, that aside from this selfish desire on the part of a public service, the cause of live stock in a broad sense has not suffered. Whether it is lived up to or not, the Department of Agriculture, through the Experimental Farms Branch, should maintain a high standard of excellence. Open competition provides for occasional, though very necessary, re-standardization. No government farm can win so consistently as to prove a menace to competition. They will not be permitted to forget the sensations incidental to seeing the judge distribute the ribbons to the other fellows.

POULTRY DIVISION

NEW CONTESTS IN NEW BRUNSWICK AND BRITISH COLUMBIA

BY F. C. ELFORD, DOMINION POULTRY HUSBANDMAN

THE only two provinces last year that did not have a federal egg-laying contest handled by the Experimental Farms were New Brunswick and British Columbia, but there was such a demand by the breeders in these two provinces for similar treatment to other provinces, that arrangements were made this year to conduct egg-laying contests at the Experimental Station, Fredericton, N.B., and at the Experimental Farm, Agassiz, B.C.

Applications for entry to the New Brunswick contest were received as early as last March when almost the full number of pens were spoken for. This contest is more than full at the present time and the accommodation will be taxed to the limit. It will be under the direct management of Mr. Pearson, who has proven himself a very efficient poultryman

in charge of the Experimental Farm poultry plant at Fredericton.

In British Columbia the demand for space in the provincial contest far exceeds the accommodation, and no doubt in this province more room will have to be provided before another year.

These two contests are running under the same rules as all the other federal provincial contests, ten birds to a pen; and the birds in the British Columbia contest will be confined to houses, as our experimental work at Agassiz has shown a higher production when pullets are not allowed range. The British Columbia contest will be under the direct management of Mr. Kuhn, who has been one of the best poultrymen with the Dominion Experimental Farms System for a number of years.

ONTARIO LAYING CONTEST

BY F. C. ELFORD, DOMINION POULTRY HUSBANDMAN

IN addition to the continuation of the Canadian Egg Laying Contest conducted at the Experimental Farm, Ottawa, during the year ending October 29, there will also be an Ontario Egg Laying Contest, open to breeders in the Province of Ontario. This contest will commence on the 1st of November, the same as the Canadian contest, and will continue for fifty-two weeks. There is accommodation for at least twenty pens of ten birds each, and at the time of writing applications have come in for considerably more than this number.

The reason for a second contest at Ottawa is because of the desire

on the part of the provincial poultrymen for an Ontario contest similar to the contests operated by the Experimental Farm in a number of the provinces last year. A contest in each province will also be a good place for breeders to send their birds first, after which they may enter the Canadian contest, if they so desire. It also provides more accommodation for owners to qualify birds for Record of Performance AA.

The birds entering the Ontario contest will be accommodated in houses similar to those entering the Canadian contest and will be placed in a second field on the Experimental Farm, adjoining the Canadian contest, which will be placed in the same location as it was last year.

NEW POULTRY BUILDING

BY F. C. ELFORD, DOMINION POULTRY HUSBANDMAN

THE long looked for and much needed office building for the Poultry Division at the Experimental Farm is nearing completion. This building, though not as large as the original plans called for, is an extremely comfortable and attractive looking building of red brick, 45 ft square. It has accommodation in the basement for furnaces, lavatory, egg and packing room, and a specially ventilated room for incubators. The first floor is given over to offices, which are well lighted and commodious. The second floor is full size. Part of will be used as a

store room for the present time, but it is so arranged that it may be utilized as a museum and meeting place.

The new building is placed on the lawn at the end of the brooder house and conforms to the general plan of the poultry plant drawn up some years ago. The poultry staff for the past six years has been housed in a building which was constructed for a feed and work house. Part of this building upon being vacated by the staff, will be used for its original purpose and part for a laboratory for Dr. Wickware who is investigating poultry diseases.

DIVISION OF HORTICULTURE

SUMMER PRUNING AT OTTAWA

BY M. B. DAVIS, ASSISTANT HORTICULTURIST

THE only evidence on summer pruning is from a young orchard planted in 1916, so that the effect this treatment has on bearing has not as yet become evident. Furthermore, owing to severe winter injury during 1917-1918, and again during 1919-1920, results have been somewhat confused. Nevertheless, it has been possible to draw some preliminary conclusions from these experiments, which seem in part to substantiate the findings of a few other stations.

With regard to summer pruning it may be added that two kinds were practised. The first was in late June, when the trees had made sufficient length of growth to warrant cutting or heading off the tips with the object of inducing the formation of a lateral branch that year, thus saving time in the formation of the tree.

From our experience, this type of summer pruning has its advantages in places where trees make rapid

growth early in the summer and on varieties inclined to throw out long branches with few laterals. If such trees are pruned at this period a less straggly and more compact tree is likely to result. The effect of this pruning on fruitfulness is not yet apparent.

The second type of summer pruning is late in August and is designed to induce fruitfulness and early bearing.

Our experiments are too recent to illustrate this point, but we suspect that this object will not be achieved unless at the expense of lack of vigour.

In brief, these experiments have shown that it is largely a question of the degree or amount of pruning rather than the season in which it is conducted that has the effect, except in such cases as previously mentioned where a certain kind of seasonal pruning is adapted to help shape the tree.

Unpruned trees have made as much growth as those that were pruned, and to date have larger girth measurements.

Pruning done at any season seems to have a devitalizing effect on the tree in proportion to the heaviness of the pruning. As it is necessary in the case of young trees to perform considerable pruning in order to

have a properly shaped tree, we have considered thus far that it is best to do as little pruning as possible, and that it really matters little at what season (spring or fall) this is done so long as the amount of heading back practised is not excessive.

As heading back in June or early July tends to bushiness, this should be practised only with straggly trees.

DIVISION OF BEES

BEE BREEDING EXPERIMENTS

BY F. W. L. SLADEN, DOMINION APIARIST

THE Bee Division has been for some time conducting experiments in the isolated mating of queen bees.

In the summer of 1913, Italian queens and drones were brought to an isolated place on the Kazubazua plains, about fifty miles north of Ottawa. Although no colonies could be discovered within three miles of this place, the colour of the workers produced was darker than that of pure Italians, showing that the queens had been mated by local black drones.

Another attempt was made in the same place in 1914. Fourteen queens of non-swarmling parentage were mated there with Italians during the first week of October, after most of the local black drones had died off. Twelve of these queens were tested the following year, but a large proportion proved unprolific and the conclusion was reached that the queens had become impaired by being reared and mated so late in the season.

Attempts made at Ottawa in 1914 to get queens and drones to fly and mate later in the day than the regular hours showed that this plan, too, was impracticable.

In July, 1918, a number of queens were bred at Ottawa from non-swarmling parentage and were taken

in baby-nuclei with selected drones to Kapuskasing in northern Ontario. It was believed that no other bees existed at or near this place. Several matings were obtained, but a number of the nuclei swarmed out because of the small size of the boxes combined with the great and sudden changes in temperature of the north country.

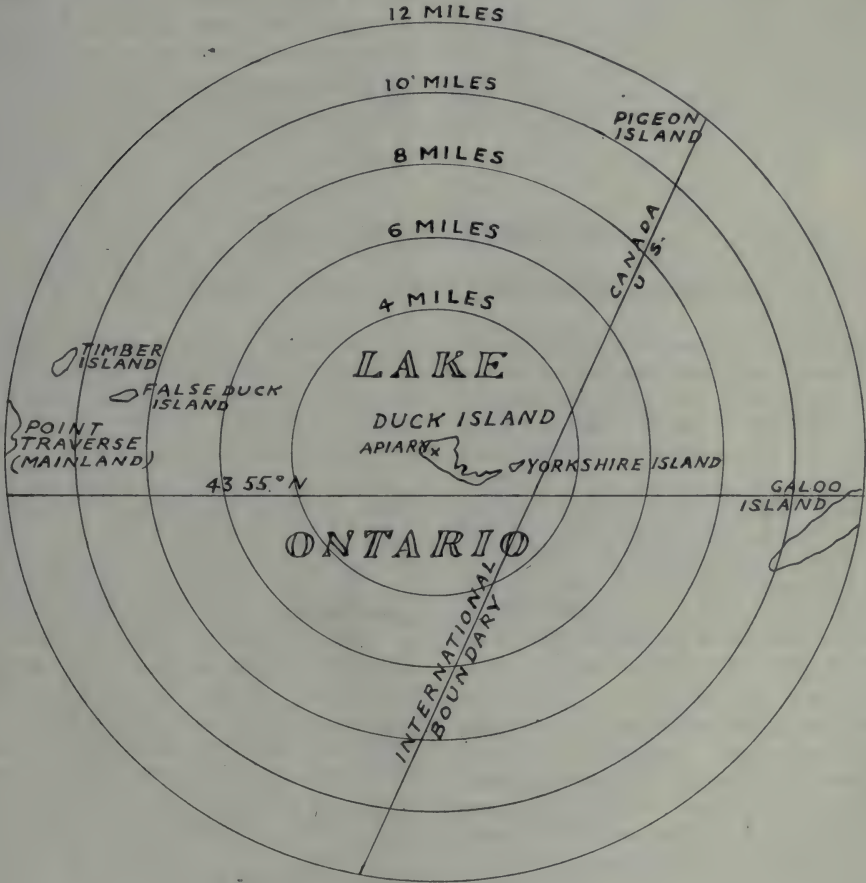
In 1919, sixteen queens and five hundred drones were taken in nuclei on regular Langstroth frames to Duck Island near the eastern end of Lake Ontario. This Island is eight miles from the nearest islands and eleven miles from the mainland. Twelve of the queens began to lay soon, but six of these produced drones only and the other six varying proportions of drones and workers. The cause of the imperfect mating was not ascertained, but it may have been that the drones were too young or too few. This experiment, however, gave much useful information. It gave evidence that the bees sent to Duck Island were isolated and that the proportion of queens lost in mating under the conditions on the island was not greater than on the mainland.

The Duck Island experiment was repeated in 1920 on a larger scale. Sixteen nuclei containing fifteen virgin Italian queens of non-swarmling parentage (two of them emerged on

July 19 and thirteen on July 25 and 26) with 2,128 drones that had emerged between July 20 and 24, were brought to Duck Island on July 28, just as the basswood flowers were beginning to open. Eleven of the queens, including the two emerged July 19, mated quickly and perfectly, producing large patches of worker

August 12 without drones, resulted in nine perfect matings, two matings producing partly drones and partly workers, and one queen lost.

The workers produced from 26 out of the 27 perfect matings were examined: they were lightly coloured enough to show that the queens were mated with Italians. This helped



LOCATION OF BEE BREEDING EXPERIMENTS

brood. The four remaining queens were lost.

Nine more queens that had emerged August 1 and 2 were taken without more drones to the island on August 3. Seven of these were mated perfectly and two lost.

Twelve more queens that had emerged August 7 to 11, brought

to support the evidence that they were mated with the drones brought, because the colonies on the nearest mainland, Point Traverse, Ont., were found to be mostly black bees.

After the removal of most of the queens on August 30 and 31, queens and drones were raised fortuitously in some of the nuclei, and when the

latter were removed from the island on September 23, it was found that a honey flow from aster was proceeding and that several of these queens had begun to lay.

Six of the successfully mated queens were mailed to branch farms, the remainder were introduced to colonies at the Central Experimental Farm.

It is planned to test the island-mated queens for non-swarming and honey gathering in 1921, and from the best of them to rear queens and drones for mating on Duck Island during the basswood honey-flow between July

25 and August 10, and possibly also during the aster flow in September.

It is also planned to commence the distribution of virgin queens, and, if possible, a few fertile queens, raised from the best Duck Island stock. Special directions for safe introduction into newly formed nuclei will be sent out with the virgin queens and it will be possible for a beekeeper to raise a sufficient number of drones from a few of these queens the following year to mate a proportion of any further virgins he may obtain.

DIVISION OF BOTANY

POTATO INSPECTION AND CERTIFICATION

IN 1915 a system of potato inspection and certification was inaugurated in New Brunswick and Prince Edward Island. This work has since been continued year by year, and extended proportionately as its value came to be recognized by growers, provincial departments of agriculture, and others interested in the purpose for which it was inaugurated, i.e., the production of potatoes for seed purposes, free from disease and true to variety.

During the season of 1920 the work has been still further extended, field inspection having been conducted in Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Northern Ontario and Manitoba. A survey, restricted to the commercial-growing districts of Southern Ontario, has also been conducted, together with a survey of some of the potato-growing districts of Saskatchewan and Alberta. The two latter provinces represent new territory—since it had not previously been found possible to give them any attention in this work—and much information on existing conditions has been secured, which will serve as a guide for future activity. It

will therefore be seen that with the exception of British Columbia, every province in the Dominion has this season received attention relative to the subject under discussion.

A description of the methods followed in the prosecution of this work may be of interest. In the early spring, application forms are sent out to the growers individually, together with a letter inviting them, in the event of inspection being desired, to fill in and return the forms by a given date. All applications received are dealt with by provinces and by counties or districts, and the inspectors are assigned territories of sufficient dimensions to keep them employed to the best advantage, but without sacrificing quality of work for quantity.

The first inspection is made of the growing plants in order to ascertain to what extent, if any, such diseases as Leaf Roll and Mosaic, which can only be distinguished by an examination of the plants, are present. It is also made as far as possible during the blossoming period, since, although the prime object of the inspection is from the standpoint of diseases, due attention is also paid

to purity of variety, and the presence of foreign varieties is more easily detected at this time. The inspector makes a thorough examination of the field and records his findings from a count and critical examination of 100 plants at each of three different parts of the field. A copy of these findings is then handed to the grower for his information. Verbal information is also given the grower by the inspector with regard to diseases which may be in his field, and with regard to recognized measures necessary for their control. In this manner considerable knowledge is disseminated, which the interested grower is always glad to receive.

In the event of a field of potatoes not measuring up to the standard set, owing to the presence of too large a percentage of disease or foreign varieties, it is given no further consideration, the grower being advised to take steps to remedy matters by securing a change of seed from some reliable source, which the inspector is usually in a position to name from his records. Should a field be found to pass satisfactorily, it is classified at headquarters as Grade 1 or Grade 2, the grading depending upon the percentage of diseases recorded, and a second inspection is made at or after

harvest time to ascertain to what extent—if any—diseases affecting the tubers, such as Common Scab, Rhizoctonia, etc., are present. If this second inspection is satisfactory, and the grower agrees to grade his stock so that a shipment of potatoes for seed purposes contains no tubers under two ounces or above twelve ounces in weight, a sufficient number of tags to cover the number of bags or other containers necessary for the shipping of the amount of potatoes inspected, is issued by the inspector and placed by him upon the shipment at the point of loading. These tags certify that the contents of the bags or other containers to which they are attached have been grown by the person whose name appears on the tags; that they have been inspected by an officer of the Department of Agriculture and found to be sufficiently vigorous and free from serious diseases, other pests and foreign varieties to warrant them being classed as No. 1 (or No. 2). Grade Seed Potatoes.

It has been found necessary until further work in this connection is accomplished, to determine standards each year. It will be instructive to the readers to be informed of the standards aimed at for the crops harvested in 1920.

FIELD INSPECTION STANDARD, 1920

Black leg.....	anything up to and inclusive of 3%.
Curly Dwarf and Leaf Roll.....	{percentages added together, and not more than 2% allowed.
Mosaic: slight and severe.....	{percentages added together and not more than 2% allowed.
Wilts.....	3%.
Weak plants.....	{ <div>(a) If percentage is given as occurring in one part of the field, same will not be taken into consideration, since for this year it is considered that such occurrence due to other factors than disease, viz. mechanical, chemical, entomological, etc.</div> <div>(b) If percentage is uniform in two or more parts of the field, no more than 3% allowed.</div>
Foreign.....	5%.
Misses.....	Not taken into consideration.

- (1) If Black-leg and Wilt are present alone, 7% allowed.
If Black-leg and Wilt are present combined, 7% allowed.
- (2) If Leaf Roll and Mosaic are present alone, 5% allowed.
If Leaf Roll and Mosaic are present combined, 5% allowed.
- (3) If a percentage of (1) and a percentage of (2) are present, 6% allowed.
- (4) Percentages of weak plants are included when figuring the above percentages, and in no case is a higher figure than a total of 7% allowed in No. 1 Grade.

In No. 2 Grade, a total of 12%, including weak plants, is allowed.

TUBER INSPECTION STANDARDS, 1920.

Bacterial Rot and Dry Rot (Fusarium).....	2%
Late Blight, Stem End Browning and Net Necrosis.....	3%
Common Scab; slight, 1-5 spots.....	10%
Common Scab; severe....	2%

Powdery Scab.....	1%
Rhizoctonia.....	3%
Silver Scurf.....	3%
Bruised or cut.....	1%
Foreign.....	2%
Frost injury.....	No Allowance.
Off type.....	2%

No. 1 Grade shall not contain more than a total of 5% of all diseases, injuries and impurities.

No. 2 Grade shall not contain more than a total of 10% of all diseases, injuries and impurities.

In all, 7,613 acres of potatoes have been inspected during the season, and the number of acres classified as Grades 1 and 2 is 2,850 $\frac{3}{4}$ and 1,051 $\frac{1}{2}$ respectively. The following tables give particulars as to localities where the work in each province has been conducted, together with the acreage inspected and passed:—

	Acreage Inspected	Acreage Passed as Grade 1	Acreage Passed as Grade 2
Prince Edward Island—			
Kings County.....	218	70	108
Queens County.....	133	83	38
Prince County.....	535	370	84
Totals.....	886	523	230
New Brunswick:—			
Carleton County.....	624	248	107
Gloucester County.....	70	47	11
Kent County.....	51	18	10 $\frac{1}{2}$
Madawaska County.....	43	43	.....
Restigouche County.....	56 $\frac{1}{2}$	51	3 $\frac{1}{2}$
Sunbury County.....	13 $\frac{1}{2}$	13 $\frac{1}{2}$	.....
Victoria County.....	367	110	47
Westmoreland County.....	106 $\frac{1}{2}$	90	5 $\frac{1}{2}$
York County.....	83	41	22
Totals.....	1,413 $\frac{1}{2}$	661 $\frac{1}{2}$	206 $\frac{1}{2}$
Nova Scotia.....	379	298	17
Quebec:—			
Bonaventure County.....	492	182	24
Gaspé County.....	42	.....	.....
Kamouraska County.....	101	41	11 $\frac{1}{2}$
Levis County.....	328	1	12
Matane County.....	1,442	288	206
Montmagny County.....	28	12	11
Rimouski County.....	947	152	95
Témiscouata County.....	404	128 $\frac{1}{2}$	87
Other Counties.....	84 $\frac{1}{2}$	32 $\frac{1}{2}$	2
Totals.....	3,868 $\frac{1}{2}$	837	448 $\frac{1}{2}$

	Acreage Inspected	Acreage Passed as Grade 1	Acreage Passed as Grade 2
Northern Ontario:—			
Algoma District.....	41 $\frac{1}{2}$	36	3
Kenora District.....	47 $\frac{1}{2}$	39	1 $\frac{1}{2}$
Muskoka District.....	15	6	3
Nipissing District.....	8 $\frac{1}{2}$	$\frac{1}{2}$	8
Parry Sound District.....	27 $\frac{3}{4}$	3 $\frac{1}{2}$	17 $\frac{3}{4}$
Rainy River District.....	35	23 $\frac{7}{8}$	2 $\frac{1}{4}$
Sudbury District.....	72 $\frac{1}{4}$	3 $\frac{3}{4}$	38
Thunder Bay District.....	224 $\frac{1}{2}$	144 $\frac{1}{2}$	54 $\frac{1}{2}$
Totals.....	472	256 $\frac{1}{4}$	128 $\frac{1}{2}$
Manitoba.....	594	275	75

In addition to these figures, approximately 3,000 acres have been surveyed in Southern Ontario, Saskatchewan and Alberta.

The disparity existing between the number of acres inspected in some localities and the number passed, should not necessarily be taken as an indication of the presence of a high percentage of disease. In many instances it has been found that although the crops would pass inspection from this standpoint, the presence of a high percentage of "mixed" or "unknown" varieties, disqualified them for any consideration for seed.

The number of inspectors employed this year has been twenty-five. Out of this number seven have been supplied through the co-operation of various provincial departments of agriculture, viz., New Brunswick 1, Quebec 3, Ontario 3, and the whole number has been distributed as follows:

Prince Edward Island.....	3
Nova Scotia.....	2
New Brunswick.....	4
Quebec.....	6
Southern Ontario.....	3

Northern Ontario.....	4
Manitoba.....	1
Saskatchewan.....	1
Alberta.....	1

A number of these men are now engaged in inspecting the crops which passed field inspection, and issuing tags at points where shipments are being made. Indications point to a big demand being made for certified seed again this year. We are already advised that seed is being shipped from Northern Ontario, that the Potato Growers' Association recently formed in Prince Edward Island is prepared to assemble 50 carloads grown in that province for shipment, and that orders amounting to 12,000 barrels have been placed by the Bermuda Government with Nova Scotia growers who make a specialty of growing seed of the Garnet Chili variety, certified to under the system.

It is desired to acknowledge here the hearty co-operation of the officials of the various Departments of Agriculture, who have consistently supported this work and furnished our inspectors with information and assistance at every opportunity.

HEALTH OF ANIMALS BRANCH

RESEARCH AND FOX FARMING

BY FREDERICK TORRANCE, B.A., D.V.SC., VETERINARY DIRECTOR GENERAL

THE problems of fox farmers in Prince Edward Island and other parts of Canada are very largely concerned with the protection of the foxes from disease and from influences which militate against their perfect health. Confined, as they must be, within narrow bounds and compelled to eat diets selected for them by their owners, with only speculative surmises of

proper method of feeding these animals and protecting them against parasites and diseases, the normal increase could be raised to two or three per pair, it would result in a very large increase in the profits of the business. That this is possible is proved by the fact that individual fox ranchers do frequently have increases of three and even four per pair, and it is evident that increased



FOX PENS AT THE RESEARCH STATION

the natural habits and tastes, it is not to be wondered at that large numbers of these valuable animals died prematurely from various causes.

The rate of multiplication of these animals is also far from what might be expected in a species which normally produces four or five at a birth. The average rate of increase in Prince Edward Island, for instance, is said to be one and a half per pair. If, through better knowledge of the

knowledge can raise the industry to a much more profitable plane.

With a view to solving some of these problems the federal Department of Agriculture has undertaken research work in the direction of ascertaining the proper food for foxes under varying conditions of age and condition, and also is studying the parasites and diseases of foxes with a view to furnishing information to fox breeders in order to enable

them to avoid as far as possible these drawbacks to their business.

The nutrition problems are being investigated at the Research Station of the Health of Animals Branch at Hull, where Mr. G. Ennis Smith is in charge of the work. Mr. Smith is a bio-chemist of experience whose contributions to our knowledge of goitre in animals is the last word in that field. He brings to his work a wide knowledge of the subject and an eager determination to solve the problems before him. His services have been secured for this purpose by the Dominion Research Council, who have appointed a committee and appropriated the money necessary for attacking this problem. The Health of Animals Branch has furnished the necessary land and equipment. Six pairs of foxes for this investigation have been furnished by the fox ranchers of Prince Edward Island, and are now under experiment. These foxes are kept under exactly similar conditions to those usually found on fox ranches, with the exception that the diet for each pair of foxes is scientifically selected and controlled by Mr. Smith, so that the effect of each particular diet can be noted upon the animals under experiment.

Work of this kind necessarily covers a long period and it is designed to find out which is the best diet for foxes during the breeding season, for the pregnant female, for the young fox and for the production of the best fur.

The problems of disease and parasites are under investigation by Dr. J. A. Allen, Animal Pathologist, of the Health of Animals Branch, who is stationed at Charlottetown for that purpose. A small laboratory

has been fitted up for this work and he has been studying the diseases and parasites of foxes for some time. Through the friendly co-operation of the fox ranchers he is enabled to study the actual conditions on fox ranches, and ranchers are frequently consulting him with regard to such problems as worms in young foxes. The damage done by these internal parasites is often very great and the importance of discovering the best method of protecting young foxes against these parasites and of removing them from their system without injury to the fox is exceptionally important. The selection of a vermifuge suitable for the purpose is one of the problems to be solved. Fox ranchers sometimes lose their young foxes from over-dosing with powerful remedies and it should be possible by experiment to decide what is the proper dosage and which is the best remedy to use.

Distemper is one of the bugbears of the fox rancher. It is a highly contagious disease, similar to the distemper of the dog, and will quickly decimate the foxes on any ranch to which it gains access. The study of this disease is in progress, with a view to finding some protective vaccine which will increase the resistance of the fox so that he can withstand infection, or where this is not possible, throw off the disease without danger to life.

Other problems of a like nature will be taken up as opportunity is afforded, and there is every reason to expect that the work of these two scientists will result in lessening the losses of those engaged in the industry and increasing their profits to a considerable extent.

LIVE STOCK BRANCH

LEGISLATION FOR THE PROTECTION OF SHEEP AGAINST DOGS

BY A. A. MACMILLAN, CHIEF, SHEEP AND GOAT DIVISION

THE question of legislation for the protection of sheep against dogs is always of permanent interest to sheep raisers throughout the Dominion. All the provinces have found it necessary to enact legislation for sheep protection and scarcely a year passes without amendments to these Acts. However, a survey of the Acts as they appear on the statutes at the present time shows that they vary greatly in their application.

The table that appears on the following pages outlines the main features of the Acts now in force.

The lack of uniformity in the various Acts cannot be attributed entirely to difference of conditions since conditions in certain groups of provinces are almost identical. In the Maritime Provinces, for instance, which easily form one group closely related, it will seem that the Act in one of these provinces does not collect any dog taxes nor is any provision made for compensation when the owner of the dog is not known. In another of these provinces, the Act does not become law until a by-law is passed by the municipality. In Ontario and Quebec, which are the two oldest and largest sheep-producing provinces of the Dominion, the Act differ widely in that in Ontario, which has perhaps the most complete Act of all the provinces, it applies throughout the entire province, while in Quebec the Act becomes effective by by-law within the municipalities. Ontario is the only province which allows full damages for sheep destroyed or injured by dogs.

In the Middle West, conditions are somewhat different to those of

the East. Ranging was general in all the provinces and is still practised to a considerable extent, especially in Saskatchewan and Alberta. Under range conditions there is not the same need for sheep protection and this probably accounts for the fact that the Western Provinces have not yet seen fit to provide the same measure of protection to sheep that the Eastern Provinces have given. Manitoba has taken the lead in providing improved sheep legislation and there is still room for advancement. In Saskatchewan and Alberta where the range flock is rapidly giving place to the small domestic flock, the time is ripe for a fuller measure of protection for the small flock owner.

British Columbia offers probably the most difficult field of any of the provinces to provide legislation which will cover all conditions. The British Columbia Act covers most completely the taxing, licensing, and control of dogs. The flock owner has no recourse, however, when the dog owner is not known and, owing to general practice of ranging stock except in specialized areas, the establishment of a sheep protection district is not likely to receive general and favourable consideration.

There is nothing that will encourage sheep men more and provide greater stability to the sheep industry than a fuller measure of protection for the small flock. The newer provinces can do much and there is still considerable room for improvement in most of the older provinces. Canada has made big strides in sheep raising during the past few years and we cannot afford to leave any impediments in the way of greater sheep production.

SUMMARY OF PROVINCIAL LAWS FOR THE PROTECTION OF SHEEP AGAINST DOGS

Province	Tax on dogs	Provision for killing of dogs	Compensation when owner of dog known	By whom compensation is paid when owner of dog is unknown	Extent to which damages are recoverable when owner is not known	Districts in which act applies
Prince Edward Island.....	None.....	Dogs not clogged or muzzled and at large may be destroyed, and dogs worrying sheep may be destroyed.	Owner of sheep damaged or injured may take regular legal action for damages. Owner of dogs must kill them.	No provision.....	No provision.....	Province.
Nova Scotia.....	Dogs..... \$ 1.00 Bitches..... 5.00 Kennel..... 15.00	None.....	Owner of sheep damaged proceeds against municipality, and municipality against owner of dogs. Collectable damages amount to $\frac{2}{3}$ total damage done.	Municipality pays damage.	$\frac{1}{3}$ of total damage done as assessed by valuers.	Province.
New Brunswick.....	Dogs..... \$ 1.00	None.....	Owner of sheep damaged proceeds against owner of dog.	Owner of sheep killed applies to council of municipality.	$\frac{1}{3}$ of damage done as assessed by valuers.	Applies only in municipality passing by-law to put act in force.
Quebec.....	Dogs..... \$ 1.00 Bitches..... 4.00	Judges may order dogs killed.....	No provision under this Act. Provided for in Statutes.	Owner of sheep killed applies to council of municipality.	$\frac{1}{3}$ of damage done as assessed by valuers.	Applies only in municipality passing by-law to put act in force.
Ontario.....	Dogs..... \$ 2.00 Bitches..... 4.00 Additional dogs..... 4.00 Bitches..... 6.00 Kennel..... 10.00	Dogs killed when taxes not paid, when caught worrying sheep or when straying at night.	Owner of sheep damaged may take regular legal action against owner of dogs.	Owner of sheep killed applies to council of municipality.	Full amount as assessed by valuers.	Province.

SUMMARY OF PROVINCIAL LAWS FOR THE PROTECTION OF SHEEP AGAINST DOGS

Province	Tax on dogs	Provision for killing of dogs	Compensation when owner of dog known	By whom compensation is paid when owner of dog is unknown	Extent to which damages are recoverable when owner is not known	Districts in which act applies
Manitoba.....	None.....	Any person may kill any dog caught pursuing or worrying sheep.	Owner of sheep may take regular legal action against owner of dog.	Owner of sheep applies to council of municipality.	Amount of damage as estimated by valuers. Amount of valuation not to exceed \$50.00	Province.
Saskatchewan.....	None.....	Dogs killed when caught worrying livestock of any kind, or may be ordered killed by justice of the peace if complaint made within three months of time of worrying.	Owner of sheep damaged may take regular legal action against owner of dog.	No provision.....	No provision.....	Province.
Alberta.....	None.....	Dogs killed when caught worrying livestock of any kind, or may be ordered killed by justice of the peace if complaint made within three months of time of worrying.	Owner of sheep damaged may take regular legal action against owner of dogs.	No provision.....	No provision.....	Province.
British Columbia.....	Dogs licensed. License fees— Dogs.....\$1.00 Bitches.....\$2.00	Dogs may be killed unless licensed and wearing collar with license tag attached.	Owner of sheep damaged may take regular legal action against owner of dog.	No provision.....	No provision.....	Applies to sheep protection districts as constituted by Lieut. Governor.

NOTE.—Proceedings of owner of sheep damaged, against owner of dogs doing damage, are taken under the "SUMMARY CONVICTIONS ACT."

SEED BRANCH

A NEW PROCESS OF SEED SEPARATION

BY A. EASTHAM, CHIEF SEED ANALYST

A NEW method of cleaning and grading seeds and grain has been invented and patented by Mr. E. D. Eddy, formerly Chief Seed Inspector of the Department of Agriculture. In the process of separation neither screens nor air currents are used, the separation being made entirely on the basis of comparative specific gravity. This is effected by subjecting the stock being treated to centrifugal action in the presence of a liquid which is of the specific gravity required for the separations desired. The patent claims included the following:—

“The method of separating grain and seeds into two grades or qualities, one lighter and one heavier, on the basis of comparative specific gravity by subjecting the same to a centrifugal action in the presence of a liquid having a density greater than the lighter grade and equal to or less than the density of the seeds or contained material composing the heavier grade; the density of the liquid to be varied according to the separation desired.”

The specific gravity of the liquid is varied according to the comparative weight of the seeds to be separated. A suitable material for making a liquid of the desired density is sodium nitrate but other substances may be used. With seeds weighing about sixty pounds per measured bushel, such as alfalfa and clovers, a solution of about 1.2 specific gravity is required. The best point of density varies with different kinds of seeds and the severity of the separation desired. By regulating the density of the liquid, the proportion of the seeds which pass into the heavy and light separations is under perfect control. With clover seed, for instance, all weed seeds and other foreign

matter, as well as shrunken, immature and light weight clover seeds of a lower specific gravity than the liquid are separated from those seeds which are as heavy as, or heavier than the liquid. The proportion of clover, seeds which will go into the light separation can be accurately regulated according to the character of the sample and the separation required.

The fact that most of the weed seeds commonly found in clover seeds are of a slightly less specific gravity than good clover seeds makes possible some remarkable separations by this process. With the ordinary methods of cleaning it is impossible to make a thorough separation of weed seeds from clover seeds if the former are approximately the same size as the clover seeds and closely similar in specific gravity. Cleaning this type of seed by screens and wind blast is far from thorough and involves a heavy loss of good seed. The advantages of the new process in such cases may be realized from the results of recent experiments made in the seed laboratory. Some of the results were secured with a small experimental machine and others with a machine designed for continuous work on a commercial scale.

Tests of several samples of red clover show a perfect separation of several kinds of the most common weed seeds classed as noxious under the Seed Control Act, including ragweed, Canada thistle, wild mustard, ox-eye daisy and stickseed, while others such as ribgrass, champions and docks were materially reduced. One lot of red clover screenings containing about one quarter ragweed seed, hulled and unhulled, was treated and the cleaned seed was entirely free from ragweed with practically no loss of good seed. Almost equally valuable are the results in reducing

the less harmful species including green foxtail which is the most common weed seed in red clover.

With alsike seed, perfect separations were made of false flax, Canada thistle, ox-eye daisy and unhulled timothy seed, while sheep sorrel, foxtail and lambs quarters were almost entirely eliminated without material loss of good seed.

The results with alfalfa seed were especially promising for they indicate that it may be possible to remove the weed seeds which have made it very difficult to produce clean seed in Western Canada and the Western States. The most troublesome weeds in alfalfa seed growing in the West are probably Russian thistle, stinkweed and wild mustard. At present it is almost impossible to procure alfalfa seed grown in Western Canada or the North Western States which does not contain one or more of these weed seeds. Furthermore in many cases they are present in such large numbers that even after heavy loss in cleaning, the alfalfa seed is almost unmarketable and its production unprofitable. One lot of alfalfa seed containing over two thousand stinkweed seeds per ounce was subjected to the new separation process and the cleaned seed was found entirely free from these weed seeds and there was no loss of alfalfa except a few light and shrunken seeds whose removal improved the sample. Equally good results were shown with a sample containing Russian thistle seed. Wild mustard was also readily separated

from alfalfa as well as from the clovers.

In the case of timothy seed most samples consist of both hulled and unhulled seed which interferes somewhat with the removal of the weed seeds. With lots however containing only a small percentage of hulled seed some very effective separations of sheep sorrel, lambs quarters and other common weed seeds were made. A separation of perhaps more value for laboratory purposes than for commercial work is that of hulled from unhulled timothy seed. Numerous tests with different percentages of hulled seed showed perfect separation. That this separation is possible is evidence of the accuracy of the process in dividing samples on the specific gravity basis.

Tests so far made have been mostly with small seeds. It is expected however that valuable results will be secured also with grains by removing barley and oats from wheat, oats from barley, etc., in addition to the separation of weed seeds.

The process is, we understand, now being developed with the idea of putting it on a commercial basis. Should this be accomplished and the results obtained with seeds cleaned for general commerce be equal to those shown in the experimental tests there should be a great improvement in the purity and general quality of the seed available, and the seed growing possibilities both for small seeds and seed grain will be greatly increased.

ENTOMOLOGICAL BRANCH

GOPHER CONTROL BY MEANS OF CHLORINE

BY A. KELSALL, ASSISTANT ENTOMOLOGIST, INSECTICIDE INVESTIGATIONS

THE following brief notes relate to the effect of chlorine on gophers, and are presented because it would seem to be possible to devise an efficient and economical method of gopher control based on certain experiments and observations. During the summer of 1920 the writer had on hand, in the vicinity of Carlyle, Sask., a supply of chlorine left over from experiments with this material on grasshoppers. At this time gophers were particularly numerous in the vicinity, partly because farmers had had to spend so much of their time fighting grasshoppers, that gophers, the lesser of the two evils, had been more or less left alone. This condition of affairs gave rise to the idea of determining the extent to which gophers could be controlled by means of chlorine.

The experiments are here recorded, together with the brief notes made on them at the time.

EXPERIMENT 1

Varying amounts of chlorine were liberated down holes into which gophers had been seen to go. Chlorine, being heavy, sank directly into the holes.

1. Holes into which a small puff of gas had been liberated. A few seconds after the liberation of the gas the gophers emerged from the holes. They were in a dazed condition, considerably distressed, and it was thought they might possibly eventually recover.

2. Holes into which a little more chlorine than the above was liberated. A few seconds after the liberation of the gas the gophers came to the mouth of the hole where they

remained gasping and in great distress. These gophers died in times varying from half a minute to two minutes after appearing at the mouth of the hole.

3. Holes into which still more chlorine than the above was liberated. These gophers did not appear at all, and it was evident that they had died almost immediately in the hole.

EXPERIMENT 2

A cylinder of chlorine having a rubber exit tube attached, was placed in a waggon and conveyed to an area where gophers were very numerous. Before commencing operations the total weight of the cylinder was noted. The time chosen was about 6 p.m. when it was known that the largest number of gophers would be out of their holes.

While driving it was noted which particular holes gophers went in (many holes were old and apparently deserted), and the waggon taken near such holes. The opening of the rubber tube was then placed at the mouth of the hole and gas turned on for one or two seconds. In each case it was the aim to liberate about the same quantity of gas as that used in Experiment 1, No. 3, or an amount somewhat exceeding this. It is to be noted that no longer time than a few seconds was taken at each hole. It was not necessary to get out of the waggon.

In no case did gophers appear again on the surface after the gas had been liberated. In this way chlorine was liberated into 42 holes, in many of which more than one gopher was known to be. It was found on again weighing the cylinder

that a little less than 4 lbs. of chlorine had been used to gas the 42 holes.

The area was examined several times on following days and either none or only one or two gophers were seen. It is evident that about one-tenth pound chlorine per hole is ample for gopher destruction.

CONCLUSIONS

From the above it was concluded that:—

(1) Gophers could be effectually destroyed by means of chlorine.

(2) The destruction could be accomplished in a short time.

(3) The method of destruction would be cheap. (Chlorine would probably cost between 10c. and 20c. per lb., in the west.)

The Entomological Branch is at the present time taking steps to have constructed special cylinders for containing chlorine which will be more adapted to this work than the cylinders of commerce such as were used by the writer. It is hoped to have cylinders of more moderate dimensions, containing say ten or twenty-five pounds of chlorine, equipped with an arrangement for automatically ejecting definite quantities of chlorine gas. Such cylinders could be easily transported in any vehicle, or could be placed on any farm implements and gopher holes gassed whenever they were come across.

It is intended next season to procure more data on, and thoroughly investigate, this method of gopher control.

"A rural high school must be of a distinctive type. The course of study must be rooted in the agricultural community, and all that belongs to it. Instead of compelling a pupil to "plug" dead languages and "cram" history, classics and higher mathematics, instruct the boys in animal husbandry, field husbandry, economics, sociology, farm mechanics, and farm management; and instruct the girls in domestic science, home economics, home nursing and all other phases of every day rural life. In other words, let every municipal high school be a farmers' college on a small scale, modelled to educate the rural population in rural districts, right at home, so to speak, where they will be retained as creditable citizens, an asset to the community, instead of being alienated from the farm as they are by taking a course in the city high schools today."

PART II

Provincial Government Departments

CHANGES IN AGRICULTURAL COLLEGE COURSES

MACDONALD COLLEGE

A NUMBER of important modifications have been made in the courses of study at Macdonald College. These changes include the introduction of a winter course in agriculture, junior matriculation examination for entrance to the four-year course, commencing of specialists in the third year, additional options to the four year course, besides a provision for post graduate work.

The winter course in agriculture is of $4\frac{1}{2}$ months duration, commencing November 1st, and finishing March 15th. It affords a special opportunity of spending a winter season in studying agriculture, and the time is selected with a view to interfering as little as possible with farm operations. It is intensely practical in character and is designed with the following objects in mind:—(1) To give the largest amount of information and training in practical agriculture in the shortest possible time. (2) To equip the farmer for solving his own farm problems. (3) To awaken him to the many opportunities on the farm and to give him an inspiration along agricultural lines. (4) To enable him to fill a more useful place in rural citizenship. The course of study includes agricultural economics, agricultural engineering,

animal husbandry, bacteriology, biology, cereal husbandry, chemistry, dairying, English, farm management, horticulture, mathematics, physics, poultry husbandry, and veterinary science.

For admission to the four-year course leading to a degree, candidates are required to have passed a junior matriculation examination for entrance to the faculty of agriculture which is held in June to September, at McGill University and which the local centres provide.

In order to obtain specialists' standing in animal husbandry, cereal husbandry, entomology, horticulture, or plant pathology selective courses, it will in future be necessary for the student, in both the third and fourth years, to take 50 per cent in each major subject, and 60 per cent in the aggregate of major subjects.

In the four-year course, the additional options introduced this year include plant pathology, entomology, and selective options consisting of major subjects selected from any option and as sanctioned by the faculty.

Post graduate courses are arranged for with the committee of graduate studies, McGill University. These courses may lead to the M.S.A., M.Sc., or Ph.D., degrees.

MANITOBA

BY G. A. SPOULE, REGISTRAR

A NUMBER of changes have been made in the courses at Manitoba Agricultural College.

In both agriculture and home economics this year the degree and diploma classes are separated from the beginning. Heretofore these two classes took their work together in first and second years, degree students being taken separately for third, fourth and fifth years. In the past a student to be allowed to proceed to third year degree must have obtained in his junior years a general proficiency of 60 per cent. Now, Grade XI or matriculation is required for

entrance to first year of the degree course in both agriculture and home economics. In home economics a student who enters on Grade XI must get up the language requirement for matriculation before graduation. The degree in future will be designated B.S. (H.E.) instead of B.H.E.

The separation of degree and diploma students at the commencement of the course made possible a rearrangement of the studies to bring the science work into the junior years so that a proper foundation might be laid for animal feeding and cultivation in agriculture and foods and textiles in home economics.

QUEBEC

COMMUNITY SHEEP BREEDING

THE community breeding of sheep was first practised in Quebec among a few farmers' clubs in Pontiac county some seven or eight years ago. These clubs joined together and purchased sufficient rams for the sheep owners within the club areas. At the end of two years the rams were exchanged between club members or between clubs. When rams died or became unfit for service, new ones were purchased to take their places, the cost being pro-rated among the members in proportion to the size of their flocks. These clubs, through collective purchase of purebred rams and careful selection of ewe lambs to replace discarded ewes, have brought the standard of their flocks up to a very high state. The cost to each farmer has been reduced to a minimum and profits from the flocks have been increased.

More recently, community breeding was commenced on a larger scale in a number of the French-speaking parishes. Ram clubs were formed with a minimum of twenty-five members. Under this plan twenty-five to thirty rams of one breed are bought in each parish where a club is formed. In most cases each ram is used by two farmers. The clubs individually or collectively, appoint purchasing agents who are assisted by federal Live Stock Branch sheep promoters in locating suitable rams. The purchase and introduction of these rams is followed up by an educational campaign on modern and improved methods of feeding and management. Dipping, shearing, and castrating demonstrations are held. As a result of educational lectures and demonstrations the farmers realize and observe the effect of the use of a purebred ram on wool

improvement and they are able to select intelligently the most desirable ewe lambs to retain in the flock. General docking and castrating within the ram clubs and the fact that a uniform type of lamb is produced has enabled club members to

obtain the highest market prices for their lambs. Lambs from pure-bred rams average from ten to fifteen pounds heavier than lambs from scrub rams and ewes of similar breeding.

ONTARIO

THE DAIRY DEPARTMENT OF THE AGRICULTURAL COLLEGE

BY PROFESSOR H. H. DEAN, B.S.A.

THE work of the Dairy Department, naturally divides into two main parts—teaching and investigational. As classes are in attendance about eight months of each year, this leaves four months for study of dairy problems, out of which time must come the necessary holidays for a limited staff of teachers and investigators. This time is altogether too short for effective work. A dairy staff devoting all their time to research work is very much needed, in order to make proper advancement.

LINES OF INVESTIGATION FOR 1920

The chief problems studied in 1920 were:—the percentages of fat, solids-not-fat, and acidity in the milk of three cows belonging to each of three breeds of dairy cattle. The rate of acid development in the milk after it was drawn from the cows has been carefully noted. The results are very interesting and will be published later. There is a marked difference in the composition and acidity of milk from cows belonging to different breeds, and also among cows of the same breed. In buttermaking, the main investigations were with reference to the pasteurization and neutralization of cream, together with studies in connection with the "Storch" and

"Potassium Iodide" tests for pasteurized milk, cream, and butter. The Chemical Department of the College co-operated in this work and some valuable data were obtained. The Bacteriological Department assisted in the study of yeasts and molds in butter. There was worked out a practical method of preventing these by thoroughly steaming vats, gates, pipes, churns, etc., and in addition filling the churn with lime-water and allowing this to remain in the churn while it was not in use, such as over night or over Sunday. Comparative tests were made by churning cream separated from milk at the dairy, with cream collected from farms as under the cream-gathering system. Methods of packing dairy butter to be carried from summer to winter have been tested—crops as compared with boxes, prints *vs.* solids, the former kept in brine, and stored at cellar and cold-storage temperature. The results will be valuable for farmers and others who pack butter in June and September for winter use.

In Cheddar cheesemaking, studies on problems in connection with pepsin and rennet have been continued. The results of five years' investigations show that rennet is preferable to pepsin as a coagulant of milk for making Cheddar cheese. If a full supply of rennet is not

available, then it is better to mix rennet and pepsin, rather than use pepsin alone for part of the season.

The use of what is known as a "Bulgaricus" culture instead of a lactic for ripening milk used in making cheese has been recommended. Tests during the past season showed that it was much more difficult to carry the culture made from B., as compared with the L. culture, hence we cannot recommend this change at present.

When milk comes in overripe at the cheese factory, the maker is often puzzled to know what to do with it,—whether to send it home, which usually causes trouble, or receive it and try to make good cheese. If at all possible the milk should be handled at the factory, because if returned to the farm, it is largely a loss to the producer, except it can be fed to hogs or poultry. Our tests, made by adding a "neutralizer" such as milk-lime to overripe milk, indicate that this is a practicable method of handling such milk for making cheese. If the vat of milk contains, say .23 per cent acid, and the cheesemaker is ordinarily setting his vat at .17 or .18, sufficient milk-lime may be added to reduce the acidity to the desired point before adding the rennet. Accurate acid tests are necessary—no guess work.

THE FUTURE

We have hopes for a new dairy building in the near future, in which we shall have more and better accommodation for our classes than in the present buildings, and for the present lines of work. In addition, we hope to take up new lines, like condensing and powdering milk, market milk, and ice-cream manufacture. Our students are asking for practical instruction and information on these questions. Manufacturers have problems which an experiment station alone can solve. Farmers

who produce milk used in the making of condensed and powdered milk would like to know if the present system of purchasing milk on the weight and fat basis, is correct. Ice-cream makers are much mixed in their "mix," and are not sure that they have the correct formula for best results. Problems in marketing milk are among the most difficult to solve, and have a very direct bearing on the welfare of both producers and consumers. None of these things are being investigated at any college or experiment station in Canada, so far as I am aware. By co-operation of the dairyman, the dairy chemist, and the dairy bacteriologist, some of these problems should be solved soon.

In order to develop the Dairy Department of the Ontario Agricultural College, to its highest degree of efficiency, I should like to see an expert in charge of each branch—the best trained man or woman possible in the science and art of buttermaking; the same in cheesemaking, condensed and powder milks, ice-cream, dairy farming, dairy chemistry, and bacteriology. Provision should be made whereby some of the brightest young men and women who graduate in dairying could be given an opportunity to take advanced work in some special line of dairying, with the understanding that they would be given employment at the Ontario Agricultural College or other Canadian research stations at good salaries. We ought not to have our best young men going to United States and other institutions in order to secure remunerative positions.

The foregoing plan involves scholarships or government aid to these young men and women while they secure the necessary post-graduate training and experience. The most of our students are unable to finance beyond a four-year course. In fact some find themselves quite heavily in debt at the end of a regular

college course, and they must have a position at once, in order to meet financial needs. At this point, some means should be provided whereby capable students could continue their studies without financial worries. This looks to the writer like a good way by which those able and interested in the advancement of scientific and practical dairying could help the cause. State aid ought also to be available for such a scheme.

With proper safeguards that the money would be wisely spent, and that the services of such a state-aided person would be available for at least a certain number of years after receiving the training, I know of no way by which public funds could be more profitably spent, than in assisting young men and women who show talent for dairying to complete their education.

ASSISTANCE TO POTATO WAREHOUSES AND SEED CLEANING CENTRES

IN an act passed by the Ontario legislature last year provision was made for loans by the government to co-operative associations within the province for the purpose of cleaning, storing, and marketing grain, grass, and clover seeds, and potatoes. The Co-operation and Markets Branch, under Mr. F. C. Hart as director, is charged with taking care of this service on behalf of the department. An association may borrow as high as \$3,000, which must not exceed fifty per cent of the appraised value of the property on which the loan is made. The loan

is made without interest for two years, after which the rate of interest is six per cent with provision for repayment within ten years in all. The purpose of the loan is to encourage the production and use of improved seed. Loans may be utilized not only for seed cleaning plants and potato warehouses, but also for cleaning and grading machinery. The Co-operation and Markets Branch is prepared to make recommendations with respect to the plants that should be constructed and equipped for the purposes to be served by this provision.

DEMONSTRATION WOOD PLOTS

THE Department of Agriculture of Ontario is co-operating with the Forestry Branch of the Department of Lands and Mines in establishing reforestation demonstration plots. The Honourable Manning W. Doherty, Minister of Agriculture, desires to see a plot of this character established in each township where reforestation is desirable—that is to say where there are to be found waste lands not suitable for agriculture, but which

might profitably be used for forest growth. He is laying the matter before the township councils, offering to undertake to supply and plant trees to reforest such areas and to look after the plantations in the early years of growth. The areas recommended are not less than five or more than ten acres in extent. The plots are to be purchased by the township councils who will retain the ownership and make use of any profits that may ultimately accrue.

SEED PRODUCTION ON AGRICULTURAL SCHOOL FARM

IN compliance with a resolution passed at the Field Crop Conference held in Toronto last January asking that government farms devote some portion of their land to the production of high class

include 23 acres of Banner oats, 6 acres of O.A.C. No. 21 barley, 7 acres of Huron wheat and 10 acres of Arthur peas. Mr. W. J. Bell, principal of the school, reports that the yields have been very satisfactory



ARTHUR PEAS. KEMPTVILLE AGRICULTURAL SCHOOL FARM

seed grain, the Ontario Department of Agriculture has this year grown at the Kemptville Agricultural School farm, 46 acres of crop of the first generation registered seed. These

and the quality of the seed is good. The seed is available for distribution to farmers at reasonable prices.

JUDGING COMPETITIONS

COMPETITIONS in judging were carried on at the Canadian National Exhibition, Toronto, the Central Canada Exhibition, Ottawa, and the Western Fair, London, under the supervision of the Ontario Department of Agriculture. The competitions were open to young farmers, or farmers' sons who were not graduates of an agricultural college, and who had not previously won a first prize in any section of the judging competition.

At the Canadian National, the candidates numbered 223, and represented 22 counties in the province.

The classes were divided into heavy horses, beef cattle, dairy cattle, swine, sheep, poultry, grain and roots, fruits and vegetables. At the Central Canada Exhibition, the competition was confined to the judging of beef cattle, dairy cattle, sheep, swine, and heavy horses. There were 145 contestants, representing 9 counties in the eastern part of the province. This was the first year that judging competitions were conducted at the Western Fair. The stock judged comprised beef cattle, sheep, and heavy horses. Eighty-one young men competed. The candidates in

these competitions consisted largely of members of Junior Farmers' Associations, trained in judging by the agricultural representatives in the respective counties.

The prizes provided by the respective fair associations ranged from fifteen dollars for first to seven dollars for 9th in the different classes,

and were awarded on a basis of 50 points for placing and 50 points for reasons. An entrance fee of fifty cents was charged. The judges of the contests were officials of the federal and provincial departments of agriculture, and prominent live stock breeders.

MANITOBA

THE CULTIVATION OF FRUIT

BY ERNEST HAYTER, SUPERINTENDENT, DEMONSTRATION FARM, KILLARNEY

THE possibility of growing fruit in the south western portion of Manitoba has, in some measure, been assured. That there is much need for more experimental and investigational work along this line is of course admitted. Our experimentalists and investigators have produced and are producing strains of fruit trees which are hardy enough for propagation, provided the trees, after setting out, are given reasonable care and attention. This is no doubt where most of our farmers, fall down in attempting to grow fruit. Most farmers, after going to the expense and trouble of starting a small fruit garden, do not give any thought to the subsequent care of the orchard, with the result that the trees soon die. To endeavour to show the farmers in a practical way how to grow and care for fruit trees and the most suitable variety to grow, the Demonstration Farm at Killarney has been started.

The farm comprises some eighty acres and is situated on the banks of Killarney Lake. The farm is somewhat sheltered by natural bluffs on the north and part of the west side but it has been found necessary to grow windbreaks for protection on the south side of the farm. The windbreaks now set consist mainly of Manitoba Maple, Cottonwoods and

Laurel Leaved Willow, in rows three feet apart. Other windbreaks will be planted and use will be made of the *Caragana arborescens* and the Laurel Leaved Willow. Experience has taught us that the single row, closely planted, produces the most useful hedge. The single row hedge also has the advantage that cultivation and manuring can be carried on close to the trees.

The small fruits set out wintered through the extreme cold weather of last year exceedingly well and started in the spring in a vigorous manner. Much fruit was borne by the bushes and the following notes, taken in the field, give some idea of the adaptability and suitability of the different varieties:—

Currants:—

White Cherry.—Wintered through with some killing back. Medium growth during summer. Fruit of good size and quality but poor yield.

Red Grape.—Wintered through in good condition. Fruit good quality but disappointing yield.

New Red Dutch.—Wintered through with some killing back. Yield good but fruit of medium quality.

Ruby Castle.—Wintered well. Good growth during summer. Yield was medium and fruit small.

North Star Red.—Wintered well. Good growth. Medium yield but fruit small.

Currants:—Concluded.

Eclipse.—Wintered well but medium growth during summer. Yield was medium but fruit small.

Black Top Giant.—Wintered through with some killing back. Medium growth during summer. No fruit.

Black Naples.—Wintered well. Heavy growth during season. Good yield of fruit of good quality.

Perfection.—Wintered well. Medium growth with good yield of large high quality fruit.

Crandal Currant.—Wintered well. Heavy growth with good yield of large fruit of high quality.

Strawberries yielded well and especial mention must be made of the Progressive Everbearing variety. At time of writing (October 11th) this variety is still bearing large luscious fruit.

No apple trees bore fruit this season. Unfortunately rabbits did considerable damage last winter but there has been an exceptional growth this year.

Only two varieties of plums are being grown at present. A good



EARLY OHIO POTATOES, DEMONSTRATION FARM, KILLARNEY

Gooseberries:—

Carrie.—Good growth during season. Good yield.

Downing.—Very little growth during season. No fruit.

Houghton.—Wintered well. Good growth and yield.

Although side by side, it was observed that the Carrie was not attacked by plant lice whereas the Houghton was badly attacked.

crop was secured although there were only six trees bearing this season. It was observed that the Aitken bore fruit of much superior quality but the yield was considerably below that of the Cheney. Quite a number of Compass Cherry trees bore fruit and this particular variety would seem to be a desirable tree for the prairie farm.

In our work we are also endeavouring to beautify the farmstead. In this connection much use is made of perennials in border work. We aim in this work to give the surrounding farmers practical demonstration of the possibility of beautifying the bare prairie farm homestead.

The future work of this farm will be purely horticultural. Next spring many acres will be planted to the different varieties of both small and large fruit suitable to the climatic conditions of the West. Strawberries will receive a prominent place

in the work of the farm. In the garden many varieties of vegetables will be tested out. Work will also be carried on with such crops as watermelons, vegetable marrows, egg plant, tomatoes, celery, etc. Potatoes will be grown on a much larger scale and the aim will be to supply the surrounding farmers with good seed of a suitable standard variety. Tree seedlings for windbreak purposes will also be grown as well as seedlings of apple and plum trees for the purpose of selection.

RURAL SOCIOLOGY AT THE AGRICULTURAL COLLEGE

BY R. W. MURCHIE, LECTURER IN RURAL SOCIOLOGY

AT the Manitoba Agricultural College since the term 1916-17 we have included in the curriculum a course on rural sociology. This course is now being extended and covers three years—the second, third and fourth years. The second-year course is designed to give our “diploma” students some knowledge of rural problems, sufficient to enable them to take an active and intelligent interest in the various spheres of public life. The third-year course is on “principles of sociology” and our fourth-year course consists of a systematic study of social problems of the rural communities of Western Canada and reviews of the latest literature on rural social problems.

Some of our students who have recently taken up Soldier Settlement work have testified to the value of their study in this department as a preparation for their work. One of these students wrote that 75 per cent of his work is rural sociology. This illustration is given to show the attitude of the students to the teaching

of rural sociology in the Manitoba Agricultural College.

The character of the course is set forth in the subjects of study as published in the calendar of the college for 1920-21 as follows:—

Rural Leadership.—Lectures on rural leadership; the practical problems of rural life in Western Canada, suggestions given as to methods of redirecting social life; conditions in the rural home, school, church and general community life.

Sociology.—Social beginnings, relations of individuals to society. Social work and legislation dealing with such questions as women and child wage-earners, industrial disputes, child welfare, care of defectives and criminals.

Rural Sociology.—A systematic study of the social problems in the rural communities of Western Canada; industrial history, showing the development of rural life; the rural home; school administration, consolidation; agricultural education; continuation classes and the wider use of the school; the rural church, its relation to agriculture; farmers' societies and associations; home economics societies, junior societies; rural health and recreation; the assimilation of the foreigner; rural surveys.

SASKATCHEWAN

INSTITUTIONAL FARMS

BY W. A. MACLEOD, EDITOR OF PUBLICATIONS

THE annual report of Mr. C. M. Learmonth, Superintendent of Institutional Farms in the province of Saskatchewan, shows that the returns from these institutions for the year ending April 30th, 1920, were highly gratifying. These institutions, attached to the Prince Albert, Moosomin, and Regina gaols, and the Battleford Mental Hospital, were affected by all the vicissitudes which visited the province last year. At all of these farms the usual grain crops are grown and in order to make profitable use of the trusty patients and prison labour, an effort is made to build up flocks and herds of creditable live stock. The stock thus raised includes pure bred Yorkshire and Berkshire swine, Shropshire sheep, and Shorthorn cattle. There is also kept at one of the farms an excellent herd of grade Aberdeen-Angus cattle, and good draught horses are maintained throughout the system. From these institutions the sales of swine alone during the year amounted to \$6,688. The farms are operated on a carefully planned rotation system.

BATTLEFORD MENTAL HOSPITAL FARM

Although through the poor crop a large amount of feed had to be purchased, the stock was kept in good condition. Twenty-one head was the natural increase of cattle, and, in addition, seventeen head of Holstein dairy cows were purchased, and before very long it will be possible to supply the entire demand of the institution for milk, though it is a heavy one. The herd is tuberculin tested. A fine new dairy barn, holding sixty head, was built during the year, and has all modern improvements. The pigs have done excellently and there are seven pure bred

Yorkshire sows. A new slaughter house was also erected, and there is a well equipped modern poultry plant with an incubator capacity of 1,200 eggs.

PRINCE ALBERT GAOL FARM

On the Prince Albert farm live stock takes the premier place. Twenty-four head was the increase in cattle, mostly from the grade Aberdeen-Angus cows. Ten head of pure bred Shorthorns, of choice Scotch breeding, were added. The usual feeding of steers was not attempted, but the steer barn was added to and will now accommodate 100 head. With the better crop this year this remunerative work will be again taken up. A new piggery is in course of construction, 84 by 30 feet, and with a good foundation of pure bred stock the good returns and satisfactory sales of the past will be increased. The horses have also done well, and there is a very fine pair of Clydesdale mares. Fodder corn and alfalfa were successfully grown, and another year it is hoped that a silo will be erected so as to insure succulent feed for the steers.

MOOSOMIN GAOL FARM

At the Moosomin farm the largest yields per acre were secured, and the farm has been well cultivated and all stock well cared for. The gaol itself is closed, but the work is done by trusty prisoners from Regina. This land must eventually be a highly specialized stock farm, as it is fenced and cross fenced. There is a fine local market, and fodder crops give fine returns. Already a good start has been made with pure bred stock, both in Shorthorn cattle and in swine.

REGINA GAOL FARM

The Regina farm, with an aggregate amount of 4,537 bushels of wheat, oats and barley, was the largest producer of the four farms. With grain and live stock from this farm the institutional farms of the province made their first appearance as exhibitors at the Provincial Summer Fair and did very well. A filly bred on the farm secured second place at the Regina Exhibition; a specimen from the fine herd of Berkshire pigs took first prize; while at the Winter Fair the department was successful in winning first prize for a bushel of Marquis wheat, an honour in which great pride was taken. The total prize winnings for the year amounted to \$151.50. The sheep on this farm, besides rendering great assistance in the control of weeds, have made excellent returns. They increased during the year from

85 to 123 head, besides which 12 pure bred Shropshire rams were sold for nearly \$400 at the Winter Fair sale. A new sheep-shed, 80 by 16 feet, was recently erected, with an "L" 40 feet long for lambing pens.

THE RESULTS

The detailed statements of the operations for the year on the farms show that a total of 14,190 bushels of wheat, oats and barley were raised from 1,332 acres seeded. During the season, horses, cattle, sheep, and swine were sold to the value of \$9,400.54, while the present holdings of all these breeds show considerable increases in every case over those of last year.

"On the whole," says Mr. Learmonth, "the four farms are now in a very satisfactory condition, and the point has been reached where healthy and rapid development in the near future may be confidently expected."

POULTRY CULLING

BY W. A. MACLEOD, EDITOR OF PUBLICATIONS

THE Department of Agriculture of Saskatchewan, through the Extension Department of the College of Agriculture, is sending out men to cull flocks of pure bred poultry in the province. These men, who are under the direction of R. K. Baker, Professor of Poultry Husbandry, and Mr. J. G. Rayner, head of the Extension Department, will assist owners in selecting their best birds to be retained as breeders and in weeding out the poor producers.

The secretaries of all poultry associations have been asked to forward to the Director of Extension a list of all poultry raisers in their districts who wish to avail themselves of this service, stating in each instance the breed and approximate number of birds kept.

With the small number of inspectors available, it will be impossible to undertake to cull flocks of mongrel or cross-bred fowls, but the inspectors will be glad to show poultry raisers how to do this work for themselves.

ITINERANT TEACHERS OF HOUSEHOLD SCIENCE

THE Department of Education of Saskatchewan has made provision for granting half the salary up to \$750 to any school district employing an itinerant teacher of household science. This teacher is expected to carry on the work in two or three town schools and give some time to supervising the sewing and noon lunch in the surrounding rural district. The regular teachers in the public schools have shown their desire to do household science work in their schools. Their efforts, it is

felt, would be greatly encouraged if itinerant specialists were placed in the districts to direct the work and to give the necessary assistance. With a view of further extending household science instruction throughout the schools of the province, the University of Saskatchewan has undertaken to give a one-year training course in home economics to experienced teachers. To be eligible for this course teachers are required to hold at least a second class certificate and to have three years' successful training experience.

FIELD CROP COMPETITIONS

BY J. G. RAYNER, DIRECTOR EXTENSION DEPARTMENT, COLLEGE OF AGRICULTURE

WITH the better general crop conditions in Saskatchewan this year, the Agricultural Societies have experienced somewhat of a revival of interest in field competitions, 33 of these competitions being held this year as against 19 in 1919. Not only was there a larger number of competitions, but the number of competitors was also greater. The largest number of entries in the wheat field competitions was 20, for oats 12, for potatoes 10; similar numbers for flax, barley, etc., and in one bare fallow competition 18 fields were entered.

These competitions were all held under rules similar to those used in 1919. It is expected that a number of combined seed crop and cleaned seed competitions will be taken up in 1921. The purpose of seed fairs and field competitions is to demonstrate the value of pure seed, to encourage its more general use, and to bring together the man who has such seed for sale and the man who wants to buy. The competition as outlined in the new regulations issued by the Seed Commissioner should serve this purpose.

A revival of interest in seed fairs is also expected as the result chiefly of improved crop conditions.

In view of the rather acute feed situation in the province during the last two or three years some of the societies have adopted the progressive practice of offering prizes for forage crops. In a few cases prizes were offered for fields of sunflowers. Such competitions are progressive because they aim to be of real service to the community by helping to meet a vital need. It is expected that there will be rather widespread interest in forage crop competitions during the next crop year.

SEED DRILLING COMPETITIONS

Another activity somewhat allied to the foregoing is the seed drilling competition; 4 of these were held in the province this year. These are particularly of value because of the interest they create in good workmanship.

It is also self-evident that a field evenly sown, with the seed placed at a uniform depth and with no missed patches (which foster the growth of weeds) will produce a cleaner and more uniform sample of seed than a field sown in a slipshod manner. The holding of such competitions will continue to be encouraged.

BETTER FARMING COMMISSION

FOLLOWING recommendations made at the Better Farming Conference held in Swift Current in July, a commission has been appointed to investigate dry farming methods in certain states of the American Union, and, on the information secured, to draw up a policy for developing the agricultural resources of the drier parts of Saskatchewan. The Commission, consisting of Dean Rutherford of the College of Agriculture; President Bracken of the Manitoba Agricultural College;

H. O. Howell, Manager of the Weyburn Security Bank; Neil McTaggart, farmer, Gull Lake; Geo. Spence, M.L.A., for Notukeu; and F. H. Auld, deputy minister of agriculture, who will be the secretary, has started upon a tour through Montana, Idaho, Wyoming, and other dry-farming states. After the conclusion of the tour, and before a policy is laid down, public hearings will be held at a number of points in the southwest part of the province.

ROAD DRAG COMPETITION

BY W. A. MACLEOD, EDITOR OF PUBLICATIONS

MR. A. A. Wilson, Inspector of the Department of Highways of Saskatchewan, reports that 151 rural municipalities and auto clubs have entered for the road drag competition this year. This is more than double the number

of entries of any previous year and is the result of a change in the rules whereby each municipality is to be paid for the work done provided they convince the inspector that an honest effort is being made to improve their roads by the use of the drag.

ALBERTA

TECHNICAL EDUCATION FOR FARMERS' SONS

BY D. A. CAMPBELL, DIRECTOR OF TECHNICAL EDUCATION

NO line of business requires so much knowledge of a mechanical kind as that of the farmer. The modern farm is supplied with labour-saving implements and machinery and in their efficient use the farmer must either gain a knowledge of their mechanism or employ some one who has it. Instruction in the mechanical principles and construction of farm machinery is a new field which is becoming more important in modern farm operations with the increased production of machines to lighten the burden and expense of farm life.

Farm machinery is complicated, and gets out of repair. It is constructed

on fundamental principles, and it employs the parts which form the basis of all machines—the lever, the gear, the pulley, and the inclined plane. The economical use of machinery and the ability to take apart and to reconstruct depend upon a knowledge of the mechanical features of the machine. Since more machinery is required and used on the farm than in the manufacturing industry, a mechanical training is as important to the farmer as to the worker in industry. When it is remembered that the farmer lives an isolated life and in the West may be many miles from a repair shop, it must be manifest that an education

in farm mechanics is of great importance to him, and should form part of the training of every farmer's boy.

Courses in farm mechanics for farmers are now given at many institutions of learning on this continent, and it will be of interest to every farmer in Alberta to know that the Provincial Institute of Technology and Art at Calgary which opens on

November 8th has included in the list of courses such subjects as farm machinery, farm forging, farm carpentry, gas engine, motor and tractor operation and repair. While farming is his main business, the mechanical work done during the intervals when his time is not otherwise occupied will ensure a working equipment when loss of time means money.

BRITISH COLUMBIA

LIVE STOCK JUDGING COMPETITION

THE University of British Columbia through the Animal Husbandry Department conducted a competition in judging live stock for young men at New Westminster exhibition. The class included thirty candidates who were required to judge five different classes of live stock and put their placings and reasons for doing so on cards. In each class five prizes were awarded,

ranging from \$12 for first to \$4 for fifth. At the conclusion of the competition the animals were gone over by capable judges and placed according to merit. In each case reasons for their choice were given to the competitors. The boys were divided into two groups, one for returned soldiers and one for boys under twenty-one years of age.

APPOINTMENTS

BY F. M. CLEMENT, B.S.A., DEAN OF THE COLLEGE OF AGRICULTURE

THE following appointments have recently been made to the agricultural staff of the University of British Columbia:—

Mr. E. A. Lloyd, B.S.A., who has for the past year been instructor to returned men in the Department of Poultry Husbandry has been given the status of Associate Professor, and made acting-head of the Department. Mr. Lloyd is a graduate of the University of Saskatchewan.

Mr. N. S. Golding, N.D.D., N.D.A., B.S.A., who for the past year has been instructor to returned men in the Department of Dairying has been

made Assistant Professor in that Department. Mr. Golding is a graduate of the Ontario Agricultural College, and in addition holds English certificates in dairying and agriculture. He has had experience on the staff in the Department of Dairying at the Ontario Agricultural College, and also in the Department of Dairying at the Iowa State College, Ames.

Mr. G. B. Boving, B.S.A., who for the past year has been instructor to returned men in the Department of Agronomy, has been made Extension Assistant in that Department. Mr.

Boving is a graduate of Macdonald College, Quebec.

Mr. A. Derrick, B.S.A., a graduate of Macdonald College, Quebec, has been made Field Assistant in the Department of Agronomy.

Mr. R. L. Davis, B.S., M.S., has been made Assistant Professor in the Department of Animal Husbandry. Mr. Davis is a graduate of the University of Montana, and in addition

has his master's degree from Iowa State College, Ames.

Mr. F. E. Buck, B.S.A., who since 1911 has been at the head of the Ornamental Section of the Division of Horticulture of the federal Experimental Farm at Ottawa, has been appointed Assistant Professor of Horticulture. Mr. Buck is a graduate of Macdonald College, and also received training in landscape gardening at Cornell University.

POULTRY INSTRUCTION AT THE UNIVERSITY

A VERY thorough course in poultry husbandry is given in the University of British Columbia. Nine classes of study in this industry are provided for—general markets and marketing, incubation and brooding, breeding, poultry management, feeds and feeding and advanced poultry husbandry. The flock includes about one thousand hens of the White Wyandotte, White

Leghorn, Rhode Island Red, and Barred Rock breeds. The hens are being trap-nested and are used for students' practice work and study and for breeding high-producing strains. Already certain families give unusual promise. Special attention will be given to the higher development of these families which represent different breeds.

PART III

Junior Agriculture

DEMONSTRATIONS, COMPETITIONS, AND CLASS-ROOM STUDIES IN RURAL
LIFE FOR BOYS AND GIRLS

NOVA SCOTIA

CLASS ROOM STUDY WITH SEEDS

BY P. J. SHAW, HORTICULTURIST, AGRICULTURAL COLLEGE, TRURO

INTERESTING material for autumn nature study for rural schools will be found in the seeds of various plants. These may be seeds of garden vegetables and flowers, seeds of fruits, or of wild flowers of the fields and the woods, or of native and imported trees and shrubs. The children's motive for gathering seeds may be to make a collection, or to get seeds to plant and to grow. The teacher's aim in this work would be to have the children, while doing this, find out by independent effort all they could about the seeds and the plants on which these seeds grew.

One hundred things might be outlined to look for and to find out about seeds, or the teacher and pupils might be left without an outline to find out what they could by themselves. In the latter case they might only discover five things instead of one hundred, but since the discovery of five things independently might easily be worth more than finding out one hundred things by being told what to look for, it is here merely suggested that teachers try to interest their pupils in collecting the ripe seeds of all the plants they can find bearing these seeds, and then to find out all they can about both the seeds and the plants which bore them and the relation of the seed to the fruit.

Pupils might be asked to search in their gardens at home for ripe seeds of vegetables, flowers and weeds, and to bring to school these seeds, together with the pods, or shells or fruits in which they grew.

SEED STUDY

The teacher, of course, should take proper interest in these seeds and try to find out all she can herself about them. The seeds might be preserved in small bottles, in paper bags or other convenient receptacles. They might be used to plant later, they might be examined and used as objects to sketch, or draw, and to study. In connection with this work an inventory of the different kinds of vegetables and flowers grown in the home gardens of the section might be made, and a list of the wild flowers found and of the different native trees growing in the neighborhood. Attention might be called to the nature of a seed, how it contains a young plant and, in annuals, is the means of carrying the plants over winter.

Some vegetable garden crops are harvested as seeds. What are these crops? Some are harvested as fruits containing seeds. What are these? Some do not ordinarily produce seed in the garden. What are these? One vegetable garden crop never produces seed. What is it? Find

out which vegetables produce seed the first year, collect seeds of these and the pods or fruits in which the seeds grew. Classify vegetables into annuals, biennials, and perennials. Save some biennials to produce seed next year. Some pupils may become interested in vegetable seed production. Bulletins on this subject may be obtained free by addressing the Publications Branch, Department of Agriculture, Ottawa.

KINDS OF SEED

Some seeds which will be found interesting are those of peas, beans, tomatoes, lettuce, cucumber, pumpkin and squash, corn, rhubarb, spinach and potato; seeds of flowers, such as pansy, bachelor's button, nasturtium, morning glory; seeds of weeds, such as pigweed, cadlock, shepherd's purse, dandelion; seeds of fruits, such as apple, pear, plum, cherry, ever-bearing strawberry if any are grown, blueberry; seeds of wild flowers such as Mayflower, trillium, clintonia, lady's slipper, violet, daisy, buttercup, golden rod, aster; seeds of native trees such as beech, maple, birch, oak, ash, hazel nut, spruce, fir, hemlock, pine. Who knows what each of these seeds looks like? How many kinds can be found?

Tree seeds which are to be planted should either be planted as soon as they are gathered or should be kept cool and moist in a box of sharp sand until next spring. The usual method is to place the seeds in the box in layers with alternate layers of sand. They should not be allowed to become very dry. If planted in the fall, the ground should be well prepared and should be sandy or gravelly so that it would not bake or become too hard by next spring. When seeds are placed in a box of sand to keep through the winter the box is usually buried a foot or two below the surface of the ground in sandy or gravelly soil, or placed on a cellar floor where the seeds will

keep cool and moist. Care should be taken to prevent injury from mice or other rodents.

Pupils might in this way become interested in growing useful fruit or ornamental trees or shrubs to plant on the school grounds or at home. But the really valuable part of any of this work would not be the plants grown, but the interest created in these things and in what the pupils are led to find out for themselves while they collect the seeds or grow the trees and shrubs. Did you ever try growing strawberries from seed? Or potatoes or cranberries or apples? These all grow freely.

STARTING SEEDS

Small seeds should be started in the house in boxes of fine soil. The boxes should be covered with panes of glass or with burlap, or newspaper, until the seeds begin to come up. The seeds may be sown in the fall or in the spring, or in both. If planted in the fall they are not likely to survive the winter in the ordinary school room, or home, but will serve as good material to study, and more seeds may be sown again in the spring if enough have been gathered.

It is generally well to let the pupils make their own study of the objects in their own way, and with as little interference from the teacher as possible. Often, however, a suggestion is useful to start an interest. To make a comparison of material often brings out important points.

Some pupils may be more interested in studying a few kinds of seeds, or even one kind, than many kinds. For such pupils a thorough study of even one kind of seed, extending throughout the year, might be of more educational value than learning a little about every kind of seed that can be found. For instance, a pupil might collect apple seeds of different varieties of apples, studying their different characteristics, store some

seeds to keep properly through the winter, planting others in the autumn. Then study the growth of young seedlings, and the differences as these seedlings develop, and finally, when they are old enough in one or two years, graft them to desirable kinds. Many things might be discovered in this work by the pupil. Another pupil might be interested in the seed production of a biennial vegetable such as a turnip or a parsnip. The selection of a suitable plant for this purpose would call attention to the importance of the use of good seed

in gardening and the methods by which such seed is produced.

The object is not to impart information, but to interest the children in these things and to try to develop in the children the power and the habit of finding out for themselves, that is, the power of independent investigation. A few things found out under the impulse of interest will be more valuable than many things found out by the teacher's requiring the pupils to see these things. The investigation on the pupils' part should be free and untrammelled.

RURAL SCIENCE NOTE BOOKS

BY L. A. DEWOLFE, DIRECTOR, RURAL SCIENCE SCHOOLS

CHILDREN'S rural science note books should contain such material as the following:—

1. Home garden plans, drawn to scale, with list of things planted, dates, brief descriptions, drawings, etc., covering the year's work. (These notes grow as the season advances.)

2. Lists of exhibits at the school fair with notes and comments.

3. Lists of home activities such as sewing, cooking, woodwork, raising chickens, pigs, calves—with notes and drawings.

4. Notes on botany, minerals, birds, insects, soils, fertilizers, spraying, etc.

5. Story of the hot noon lunch—how prepared, equipment used.

6. Notes on practical hygiene and sanitation as actually practised in the school.

7. Notes on plays and games in which the teacher participated. All note books should be kept in the school room a full year, so that if the inspector visits early in the term he can see last year's books.

ONTARIO

SCHOOL FAIRS IN ONTARIO COUNTY

IN the county of Ontario, the office of the agricultural representative has been moved from Whitby to Uxbridge. The representative, Mr. R. M. Tipper, reports that fifteen school fairs were held in the county this year. Prize lists for these are similar throughout and correspond very closely with the fairs held in all the other counties in the province.

The classification includes potatoes, grain, corn, roots, and vegetables, fruit, flowers, girls' work,

including cooking and needle work, collections of weeds, insects, and fungoid samples, poultry and live stock. Each of these classes contains from 6 to 18 sections and affords prizes varying from \$1 to 25 cents in live stock, and 30 cents to 10 cents in fruit. The prizes number as high as six in some of the sections. In the potatoes, Irish Cobbler and the Green Mountain alone are provided for. Sections call for different quantities.

In grain, the barley is confined to O.A.C. No. 21, and the oats to O.A.C. No. 72.

In corn, the Golden Bantam and Longfellow are chosen as table corns, while in the field sections the competition is taken in any variety of Dent and Flint.

In roots and vegetables, the varieties recognized are for mangels, Yellow Intermediate; turnips, Purple Top Swede; beets, Detroit Dark Red; carrots, Chantenay; and onions, Yellow Globe Danvers.

The only named varieties of apples in the fruit list are Snows and Spies. The other sections provide for fall and winter apples, also pears and tomatoes.

In the flower class three sections provide for as many bouquets, first of Spencer hybrid sweet peas, Giant Comet asters, and three of mixed flowers.

In the poultry class the Barred Plymouth Rock is the variety recognized. Wire coops are provided, and only three chickens are needed to make an exhibit. This class provides for chickens as well as eggs. The egg sections are for one dozen brown in one case, and one dozen white in the other.

In the live stock class the competition is open to colts and calves. Prizes are awarded on the basis of training, 60 per cent; grooming or preparation, 20 per cent; and type and quality of animal, 20 per cent. It is required that the stock be exhibited by the pupil, and from the home farm.

A class in which great interest is taken provides for manual training, free hand drawing, art in water colours, and essay writing.

The exhibitors are advised in advance that neatness or preparation of exhibit is an important factor to be considered when judging. Uniformity of size, shape, and colour with quality and freedom from blemishes are recommended to be kept in mind in selecting exhibits of fruit and vegetables.

Following are the general rules governing fairs:—

1. The fair is free to all, pupils and no entry will be charged.
2. Ribbons only (no money prizes) will be given to any school not donating to the prize list fund.
3. All exhibits must be the property or work of the exhibitor.
4. No pupil may make more than one entry in any one section.
5. All exhibits of potatoes, roots, corn, grain, flowers, and poultry must be from seeds or eggs supplied by the Department of Agriculture, except where otherwise stated.
6. Exhibits which have won a first prize in previous years cannot be entered again for competition.
7. In case of dispute or protest, in manual training and domestic science classes, parents may be required to sign a declaration, stating that the work was performed by the exhibitor.
8. All entries, as far as possible, must be made to the school fair director.
9. All exhibits must be in place by 11 o'clock and left until 4.15 p.m.
10. Pupils shall mean boys and girls who have attended school at least six weeks since January 1, 1920, or who are attending school at the time of the fair.
11. Any person found guilty of breaking the rules of the Association shall not receive a prize.

GOVERNMENT PUBLICATIONS FOR AGRICULTURAL CLASSES

BY A. J. MADILL, B.A., NORMAL SCHOOL, PETERBORO

PUBLICATIONS of the federal Department of Agriculture, as well as those of the Ontario Agricultural College, have been used for the past two years in connection with the teaching of agriculture to the members of Normal classes.

Sometimes when teaching a lesson, or rather a series of lessons, on poultry or other subjects, I have used the bulletins or pamphlets for information and to pass out to the members of the class, so that they may see the illustrations, and for further study.

On some topics, as the apple, pasteurization of milk, drainage, fertilizers, vegetable gardening, insecticides and fungicides, candling of eggs, weeds, etc., I find the bulletins most helpful, and in many cases give each student one to take with him or her for reference when teaching agriculture in their own school. In that way,

when the students leave here, they not only have their manuals and text books in agriculture, but many useful bulletins, which give specific and recent information regarding some of the most important topics. The bulletins are also used in the school for permanent reference, and are available in the reading room.

PRIZE-WINNING SCHOOL EXHIBIT

BY MISS HELEN C. BAKER, PUBLIC SCHOOL TEACHER, WINCHESTER

AT the Central Canada Exhibition held at Ottawa, this year, my school garden exhibit won the first award. It may interest other teachers to learn something of our system in reaching the

as Christmas concerts, Red Cross work, sports days, and other things. The parents naturally take a deep interest in the work of the pupils, and give them every encouragement to succeed. On every occasion where



PRIZE WINNING SCHOOL FAIR EXHIBIT

standard that brought us such honour. The enthusiasm of the pupils necessary for such an undertaking has never been lacking. They enter heartily into the work of the school gardens, as well as such undertakings

the opportunity for helping others presents itself, the pupils enter gladly into the work. We of the school feel interested in the welfare of the community, and the community responds generously in assisting our work.

Our motto "Hitch your wagon to a star" is constantly before us, and it has proven a wonderful power to reach a higher goal.

Our gardening was carried on in orthodox fashion, each pupil doing his share towards its success, and in helping to plan and set up the exhibit which won us the coveted prize.

SASKATCHEWAN

SCHOOL EXHIBITIONS

THE school exhibition movement in Saskatchewan is advancing with rapid strides, and the 1920 list shows a very great increase over the number of fairs held in 1919.

In 1909, the Carrot River School Garden Association organized the first school exhibition held in the province, and there were two other centres organized in 1910. The development was very slow for several years, but following the inception and development of Rural Education Associations in 1915, a great increase took place in the number of exhibitions held and the amount of interest aroused.

The greater number of exhibitions are held in the fall, September being the favourite month, but this year several centres held successful fairs during May and June. Of the 287 school exhibitions in 1920, 1 was held in May; 4 in June; 1 in July and 8

in August, while 237 were held during September and 36 during October.

An endeavour is made on the part of the Department of Education to provide at least two judges and speakers for each exhibition. This is accomplished by co-operation between the Household Science, School Hygiene and School Agriculture Branches of the Department of Education, and with the Department of Agriculture and the Extension Department of the University of Saskatchewan.

Sixteen circuits have been arranged to insure a minimum of expense in travelling and the greatest economy in the time of the judges. A special endeavour is asked for on the part of exhibition secretaries to provide an opportunity for the representatives of the department to address the gatherings.

BRITISH COLUMBIA

AGRICULTURAL BULLETINS IN THE SCHOOL

BY J. B. MUNRO, B.S.A., DISTRICT SUPERVISOR OF AGRICULTURAL INSTRUCTION, ARMSTRONG

AVERAGE farmers own the majority of our Canadian farms and their homes are just average farm homes. It is in these homes that I am familiar, not with the use, but with the misuse of the bulletins that come into the household whether they have been sent in response to a request made by

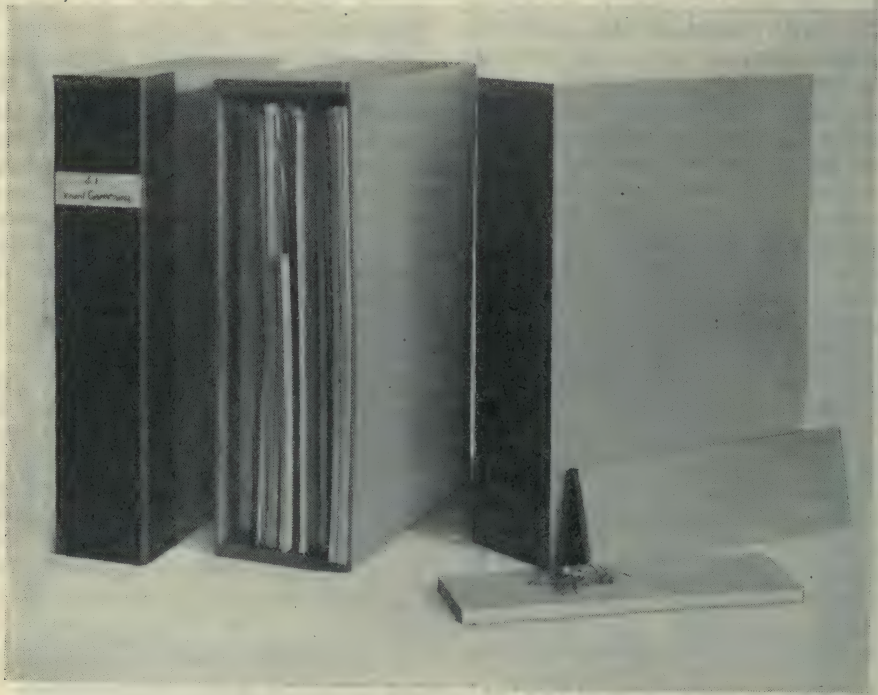
the farmer or whether they are publications that deal with pertinent and timely subjects and go from the Publications Branch of the Department of Agriculture to the general mailing list. No matter how the bulletin has arrived, it is worthy of attention, but in many cases it is condemned without a hearing and is relegated to the wood-box or sentenced

to meaner service than kindling warmth in the home.

Perhaps the various governments and departments have been somewhat at fault in that they have failed to make their publications look attractive. So many bulletins have the same official appearance and blue complexion that we cannot wonder at the groans we hear and the cry "why can't they put pleasant covers on their publications?" The

contents may be responsible for the better treatment accorded them.

However, something more than pretty covers and illustrated contents are necessary if we are to have our average farmers making proper use of the fund of information they can secure for the asking. It is difficult to educate the adults to the use of these bulletins, but through the children we can achieve much, and, after all, it is with the junior



HOME-MADE PAMPHLET BOXES FOR FILING PUBLICATIONS

cover counts just as all first appearances do, and for this reason I hold up such bulletins as "Sheep Husbandry in Canada", "Beef Raising in Canada" and "The Maple Sugar Industry", before my students as examples of what the federal government has seen fit to do with respect to covers. In all my experience I have never yet seen any of the above three bulletins being scuffed about as the blue covered ones are, and the attractive cover and well illustrated

farmers we are going to do the most lasting good. If we teach our agricultural students of today how to secure, use, and preserve for reference the publications dealing with the business and practice of farming it naturally follows that our average farmers of tomorrow will by that time have acquired the bulletin habit.

The practice of distributing bulletins among the members of the class, expecting that they will read assigned

paragraphs or absorb information, is pernicious and should be discarded by instructors. That method accomplishes no permanent good and at best its results are but temporary, and are counteracted by the distaste the pupils have toward bulletins for all future time. A wiser plan is to have the pupils write direct for the required publications and have them come addressed to the individuals themselves. In addition to starting them in the way of applying to headquarters for publications that they will later need, this practice has an important psychological influence on the individuals. The sense of ownership, and the importance these youngsters feel on the arrival of their mail, stimulate their interest in the contents of the bulletins received. We now get acquainted with our new property, not by reading choice selections nor by assigning parts, but by searching therein for something we want to know. The instructor should be very familiar with any bulletin he recommends to his classes. He is then able to lead the boys and girls right along in the quest for hidden truths. The big thing is to get the pupils keenly interested in the bulletin and then to teach them the biggest thing of all—the filing of their bulletins.

The majority of our agricultural bulletins function properly as reference books, thus the pupils should learn what to search for in each, but they should not burden their memories with too many details. As

reference books the bulletins will be retained ready for instant consultation, and to facilitate matters we number the bulletins in consecutive order in the case and list them under their respective departments in the regular publications index book prepared by the Publications Branch of the Department of Agriculture, Ottawa. Our scheme for the filing of these bulletins is taken from THE AGRICULTURAL GAZETTE OF CANADA, Part IV, page 434 for the month of May, 1920. The directions there given are complete enough and the materials, or substitutes, are not difficult to obtain, and further, the constructing of these cases is of practical value to the pupils. With bulletins that are their own property and filing cases that are their own creation they start a reference library that is bound to grow as their search for knowledge increases.

At best a college education enables a man to know where to look for what he wants, and similarly a school training in agriculture should fit the average pupils for the intelligent employment of a reference library made up in part of the publications issued by the various departments of agriculture. For the pupils to know what bulletins to get and where to get them is important; to know how to use them is more so, but to have them in constant readiness either for casual consultation or for an emergency is the factor that means success in agricultural pursuits.

NOTE.—The home-made pamphlet boxes illustrated in this article were described in detail in the May number of The Agricultural Gazette this year at page 434.

EDITOR.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications, and Notes

ASSOCIATIONS AND SOCIETIES

EVENTS OF THE MONTH

Nov. 10, 11, Annual Convention, Beekeepers Association of Quebec, Montreal.

Nov. 17, 18, Entomological Society of Ontario, Guelph.

Nov. 22-26, Auction Sale of cattle, beef breeds, Calgary.

Nov. 23-26, Alberta Provincial Poultry Show, Calgary.

Nov. 22-26, Alberta Winter Fair, Calgary.

THE CANADIAN SILVER FOX BREEDER'S ASSOCIATION

The Canadian Silver Fox Breeders' Association has been organized with headquarters at Summerside, Prince Edward Island. The objects of this association are to encourage, develop, and regulate among its members the raising of the pure bred silver fox in Canada.

(a) By keeping a record of the breeding and origin of all foxes held in captivity by members of the association, and by collecting, preserving and publishing data and documents relating to the same.

(b) By establishing standards of breeding and by carrying out a system of registration for its members.

(c) By adopting means from time to time for the protection of its members engaged in propagation and breeding of pure-bred silver foxes in compliance with the Live Stock

Pedigree Act or any regulations or by-laws thereunder.

(d) By maintaining an efficient inspection among members of the association to prevent, detect and punish fraud.

(e) By compiling statistics of that industry and furnishing official and authentic information in regard thereto.

The association has received incorporation under the Live Stock Pedigree Act. Up to the 30th of September, 1921, animals to be eligible for registration must pass inspection according to rules laid down by the association. After that date, breeding qualifications, as well as inspection will be required.

The president of the association is Mr. E. H. Rayner, New Annan, P.E.I., and the secretary Norman MacLeod, Summerside, P.E.I.

CANADIAN AYRSHIRE BREEDERS' ASSOCIATION

Mr. W. F. Stephen, Secretary of the Canadian Ayrshire Breeders' Association, reports that between the 15th day of June, and the end of September, this year, 81 Ayrshire cows and heifers qualified in the Record of Performance Test. These include 29 mature cows, 13 four-year olds, 19 three-year olds,

and 20 two-year olds. Five of the mature cows made records of more than 12,000 lbs. of milk containing from 424 to 586 lbs. of fat during the year. The highest record was 13,184 lbs. of milk and 497 lbs. of fat in 329 days. This record was made by Daisy-41396-.

WOMEN'S INSTITUTES IN PRINCE EDWARD ISLAND

The seventh annual convention of the Women's Institutes of Prince Edward Island was held in Charlottetown early in September. The secretary's report showed that there are 31 active Institutes in the province, with a membership of 600. During the year almost \$5,000 was raised, most of which was

expended on school and community improvements. Series of short courses in cooking, laundry work, home nursing, first aid, sewing, millinery, etc., were conducted in the rural districts. Miss Della Saunders is the Superintendent of the Institutes.

THE QUEBEC POMOLOGICAL AND FRUIT GROWING SOCIETY

The summer meeting of the Pomological and Fruit Growing Society of the province of Quebec was held at Aylmer, Quebec, in the month of August. At this meeting arrangements were made for improving the system of marketing apples. In co-operation with the provincial Department of Agriculture a label has been prepared to be used with strictly No. 1 apples of the Duchess, Wealthy, MacIntosh, and Fameuse varieties. For other varieties of apples to be marketed the members are being supplied with a stencil

with the words "Member of the Quebec Pomological Society" and a place for the packer's name. This stencil may be used on either barrels or boxes. A superintendent has been engaged to bring the growers in closer touch with consumers. This official will give instruction on fruit growing, packing and marketing, and will supply members with boxes, wrapping paper, labels, and other necessary material to improve and insure a good pack for the high class apple trade. The secretary of the society is Mr. Peter Reid, Chateaugay Basin, Quebec.

EASTERN ONTARIO WOMEN'S INSTITUTES

The sixth annual convention of the Women's Institutes of Eastern Ontario was held in Ottawa on October 13, 14, and 15. The Institutes represented include those for the counties of Addington, Carleton, Dundas, Frontenac, Glengarry, Grenville, Lanark, Leeds, Lennox, Prescott, Renfrew, Russell, and Stormont. The standing committees were appointed to introduce and carry on new work for the coming year under the following subjects, agriculture, home economics, immigration, education and better schools, public health, and child welfare, and publicity. The committee on agriculture will encourage women to become gardeners, small fruit growers, poultry raisers, and bee keepers, and to create a market centre for collecting and disposing of these products, beautifying and otherwise improving home surroundings. The committee on home

economics proposes to advise the department of agriculture as to the lines of work to be included in the demonstration lecture course which will be given at various times to the Institutes. The committee on immigration will secure information on immigrant families settling in Ontario and girls and women employed as domestics throughout the province. The committee on education will consider school improvement, education for retarded, illiterate and non-English speaking children, and the securing of better teachers. The work to be taken up by the public health and child welfare programme will depend upon the results of investigations to be made.

It was announced by Mr. Geo. A. Putman, Superintendent of Women's Institutes, that 30 new institutes have been added this year bringing the total number of institutes in Eastern Ontario to 107.

MILK GOAT BREEDERS' ASSOCIATION OF ONTARIO

The breeders of milch goats in the province of Ontario have formed a provincial association known as the Milk Goat Breeders' Association of Ontario. The association will make it their business to secure public recog-

nition of the value of the milch goats in family life. The officers of the association are president, L. H. Baldwin, Toronto; vice-president, C. R. May, London; secretary, J. A. Telfer, Paris.

THE ONTARIO PLOUGHING MATCH

The International Ploughing Match and Tractor and Farm Machinery demonstration under the auspices of the Ontario Ploughmen's Association were held at Hamilton on October 20 to 22. Thirteen classes were

provided for walking ploughs, and two for tractor competitions, for all of which \$1,600 in prizes are offered. The secretary is Mr. J. Lockie Wilson, Toronto.

ONTARIO DAIRY CONVENTIONS

The annual conventions of the Dairymen's Associations of Eastern and Western Ontario will be held in Cobourg and London respectively on the 6th and 7th, and 12th and 13th, of January, 1921. The usual exhibits

of butter and cheese, as well as dairy equipment will accompany these conventions. The secretary of the Eastern Association is Mr. T. A. Thompson at Almonte, and of the Western Ontario Association, Mr. Frank Hens, London.

SASKATCHEWAN SHEEP AND SWINE SALES

The annual Sheep and Swine Breeders' Association Sales of Saskatchewan will be held this year in conjunction with the Winter Fair, on the following dates: Regina Swine Sale, November 9th; Sheep Sale, November 10th, Saskatoon Sheep and Swine Sale, November 18th.

In addition to the sheep entered by the prominent breeders of the province, the

Saskatchewan Sheep Breeders' Association is importing four pure bred shearling Shropshire rams and six ewes direct from Thos. A. Buttar, Carston, Coupar Angus, Scotland. A few choice rams and ewes will also be purchased in Ontario.

The sales are conducted under the direction of Mr. J. G. Robertson, Live Stock Commissioner of Saskatchewan.

NEW PUBLICATIONS

DOMINION DEPARTMENT OF AGRICULTURE

EXPERIMENTAL FARMS

The French Canadian Horse is the title of Bulletin No. 95 of the Experimental Farms. It has been prepared by Mr. G. A. Langelier, Superintendent of the Experimental Station at Cap Rouge, Quebec. It gives the characteristics of the French Canadian horse and an account of the work that has been done for his improvement and preservation as a breed.

ENTOMOLOGICAL BRANCH

The European Corn Borer.—Crop Protection Leaflet No. 13 of the Entomological Branch, by Mr. A. Gibson, Dominion Entomologist, describes the European Corn Borer, enumerates the crops attacked, and deals with the nature of the injury and the means of control.

QUEBEC

The Quebec Society for the Protection of Plants. The twelfth annual report, which is for 1919-20, issued as a supplement to the report of the Minister of Agriculture, contains the proceedings of the winter meeting of the society held in March, 1920, at Macdonald College.

Le Comptoir Cooperatif de Montreal, a pamphlet issued by the Comptoir Cooperatif de Montreal, describes its history, method of doing business, and the extent of operations since organization six years ago. Its operations are confined to the marketing of all classes of farm produce and the co-operative purchasing of supplies for the needs of members.

ONTARIO

Community Halls.—Bulletin 279 of the Ontario Department of Agriculture, contains the act respecting the establishment of community halls and athletic fields in rural districts and the regulations relating thereto. It also contains external views and floor plans of community halls of varying sizes.

Farm Management.—Bulletin No. 278 of the Ontario Department of Agriculture, reviews the findings resulting from a survey of the businesses of beef raising and mixed farming in Western Ontario, and dairy farming in Eastern Ontario. The surveys were carried out and the bulletin prepared by Mr. A. Leitch, Professor of Farm Economics.

Annual Report of the Live Stock Branch for 1919 contains the financial statements of the Ontario Provincial Winter Fair, the report of the Ontario Stallion Enrolment Board, the report of the co-operative shipment of purebred live stock, the financial statements and lists of officers of live stock associations in the province, and addresses delivered at the annual meetings of the live stock associations.

The Agricultural Societies.—The twentieth annual report of the Agricultural Societies contains a report of the convention of the Association of Fairs and Exhibitions for the year 1920. The statistics contained in the report include a statement of grants to agricultural societies and prize money paid by agricultural societies in the province.

MANITOBA

Western Wheat Stem Saw-Fly.—Circular No. 57 of the Manitoba Agricultural College by A. V. Mitchener, B.A., Lecturer in Entomology, describes the Western Wheat Stem Saw-Fly (*Cephus occidentalis*), enumerates the damages it causes, and outlines the method of control.

Chemistry of the Farm Water Supply, Circular No. 58 of the Manitoba Agricultural College by W. F. Geddes, B.S.A., Assistant Professor of Chemistry, deals with water contamination, and recommends methods of household purposes.

BRITISH COLUMBIA

Agricultural Statistics, Bulletin No. 84 of the Department of Agriculture, British

Columbia, contains statistics of the agricultural industries of the province for 1919. These statistics relate to areas of land and crops under cultivation, production of various crops, animals, and animal products, and the climate as affecting agriculture.

The Columbia Kootenay Valley.—Bulletin No. 26 of the Department of Agriculture of British Columbia constitutes a description, by the Secretary of the Department of Agriculture, of the soil and climate of the Columbia Kootenay Valley in their relationship to agriculture. It is written in response to enquiries from intending settlers regarding the eastern section of the province.

MISCELLANEOUS

Dairy Factories, 1918, is the title of a report of the Dominion Bureau of Statistics, based on the census of industry of 1918 and deals with the products of dairy factories in Canada without regard to the production of home-made butter and cheese. It was prepared by the Bureau of Statistics in collaboration with the Dairy and Cold Storage Branch of

the Dominion Department of Agriculture, the Quebec Bureau of Statistics, and the dairy branches of the provincial departments of agriculture.

Soil Alkali, its Origin, Nature and Treatment, by F. Stewart Harris, Professor of Agronomy, Utah Agricultural College. The author, in sixteen chapters, deals with some of the important problems that bear upon the economic factors involved in the reclamation of alkali land.

Canadian Seed Growers' Association Report. The annual report of the Canadian Seed Growers' Association for the year ending March 31st, 1920, covers the 15th and 16th years' work, and contains the minutes of the 1920 annual meeting, and addresses by the Honourable S. F. Tolmie, Minister of Agriculture, Professor John Bracken, President of Manitoba Agricultural College, and others.

Working Hints for Local Unions of the United Farm Women of Alberta is the title of a pamphlet which gives the history of the organization and achievements of the United Farm Women, the plan of work, and other information useful to members.

NOTES

The farmers of Manitoba, since the beginning of 1920, have borrowed upwards of \$1,900,000 through the Rural Credit Department of the provincial government.

To cope with the increased demand for the travelling libraries issued by the Saskatchewan Department of Agriculture an additional appropriation of \$10,000 has been provided this year.

There has been added to the Shropshire flock of sheep at the Regina gaol farm, forty-one head of pure bred specimens. These are to take the place of grade animals which are being disposed of.

Mrs. G. M. Dyer, Secretary of the Province of Quebec Society for the Protection of Birds, announces that monthly meetings on behalf of better bird protection will be held this winter in the city of Montreal.

Mr. E. P. Bradt, has resigned from the office of Secretary for Agriculture for the province of New Brunswick. Mr. Bradt is engaged in fruit farming in the Niagara Peninsula.

The Saskatchewan Department of Agriculture has brought in from the Eastern Provinces, and sold to farmers five car loads of dairy cows. To meet the further demand that exists additional animals are being brought in.

The Ontario Agricultural College will not hold an auction sale of live stock this year, but will dispose of surplus animals by private sale. Surplus stock consists of calves of the Holstein breed, young stock in Yorkshire and Berkshire swine, and Leicester ram lambs.

Mr. F. E. Buck, since 1911 head of the ornamental section of the Division of Horticulture in the Experimental Farms System, has left the federal service to assume the duties of Assistant Professor of Horticulture in the University of British Columbia at Vancouver. Mr. Buck entered upon his new duties on October 1st.

The Honourable Manning W. Doherty, Minister of Agriculture for Ontario, has offered the services of a representative of the Department to farmers' clubs or other co-operative organizations to discuss the question of the business methods being followed, and to assist them in making such improvements as appear advantageous.

The Chicago Board of Trade is contributing premiums to the amount of \$10,000 for exhibits of grain and hay to be competed for at the International Live Stock exposition this year. The competition is international. For this purpose the United States and Canada are divided into six regions. Sets of prizes are offered for each region.

Mr. C. M. Laidlaw, B.S.A., ranch specialist in the Ontario Department of Agriculture, is moving his headquarters from Burwash to Monteith where he will add to his duties as ranch specialist that of agricultural representative. Mr. L. H. Hanlan, who has been the representative during the past summer, is returning to the Ontario Agricultural College to complete his course.

As a result of the efforts of the Toronto Horticultural Society, 1,532 vacant lots were cultivated in the city of Toronto this year. These lots averaged about four thousand square feet. Fourteen varieties of seed were distributed in the spring by the Vacant Lots Cultivation Association. These did not

include potatoes, tomatoes, or cabbage, all of which were grown abundantly in these gardens. Seeds were supplied free to more than two hundred returned soldiers.

The United States Department of Agriculture is holding an international judging contest for boys who are members of live stock clubs. A provision is made for sending the winners and some officials to England next summer to attend the Royal Show, and to visit a number of the large English stock farms. Those who will be entitled to this trip will include boys composing the teams scoring the highest, and the boy making the highest individual average. The State Club leader representing the winning team, also the county agent represented by the club member making the highest score as well as one Washington office club official whose territory is represented by the winning team, will accompany the boys on their trip. The Guernsey, Hereford, Shorthorn, Belted Hampshire, and Duroc Jersey breeders' associations have each offered prizes of \$100 to the teams making the highest score in judging. Twelve breeds of live stock are to be judged.

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Harvesting, Grading, and Storing the Potato Crop. W. T. Macoun, Dominion Horticulturist, page 3.

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How to Make Winter's Supply of Feed Go Further. Wade Toole, B.S.A., Professor of Animal Husbandry, Ontario Agricultural College, page 3.

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Pointers on Making High Quality Cheese. H. H. Dean, B.S.A., Professor of Dairy Husbandry, Ontario Agricultural College, page 6.

The Canadian Poultry Journal, Hamilton, Ont. October, 1920.

Poultry Diseases—Their Causes and Remedies. M. C. Herner, B.S.A., Professor of Poultry Husbandry, Manitoba Agricultural College, page 293.

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The Effect of Breeding Ewe Lambs. A. A. Dowell, Professor of Animal Husbandry, Alberta College of Agriculture, page 1703.

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Growing Grapes Under Severe Conditions. M. B. Davis, Assistant Dominion Horticulturist, page 287.

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Ensilage Production Pointers. Professor T. J. Harrison, B.S.A., Professor of Field Husbandry, Manitoba Agricultural College, page 14.

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A Wonderful Co-operative Egg Basket Set in the City of Little Hills. T. A. Benson, Dominion Poultry Representative for British Columbia, page 7.

Plant Food Economy.—W. Newton, Chief Soil and Crop Instructor, Provincial Department of Agriculture, page 3.

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to
T. K. Doherty, International Institute Commissioner, Department of
Agriculture, West Block, Ottawa.

CROPS AND CULTIVATION

Influence of Meteorological Phenomena on Plant Growth¹.—*Revue Scientifique*, Vol. 58, No. 4, pp. 115-116. Paris, 1920.

Reviewing briefly the work of Azzi of the University of Rome on the relation between critical periods in plant growth and the meteorological conditions such as rainfall, humidity, frosts, heat and drought, it is noted specially that a lack of moisture at critical periods permanently impairs the growth and reduces the yield of wheat; a deficiency of heat similarly reduces the fruit crop. From observations on the subject it has been possible to determine the mean critical periods for different plants in different regions and to record the results on so-called phenoscopic charts. These charts show the critical periods and decisive meteorological factor for each cultivated plant which, in case of cereals for example, is the amount of moisture available at the time of germination, heading, flowering, or ripening. Three means of remedying decreased yield of wheat due to drought at critical periods are suggested: (1) Changing the time of seeding, (2) irrigation, and (3) selection or breeding of drought-resistant varieties.

Frost and the Prevention of Damage by It².—*United States Department of Agriculture, Farmers' Bulletin* 1096, p. 48. Washington, D.C., 1920.

A practical treatise on the prevention of frost injury, dealing more particularly with the protection of fruit trees.

Introductory considerations are given to the changes that take place at and near the earth's surface on a frosty night and the underlying principles of frost protection. The various methods and devices now being used for protection against frost are discussed in detail. The publication also includes a chapter on temperatures injurious to plants, blossoms and fruit, and a description of meteorological instruments and methods of determining temperatures and atmospheric moisture.

(1) See also Bulletin of Foreign Agriculture Intelligence, February to May, 1916.

Relation of Snowfall to the Yield of Winter Wheat.—ROOT, C. J., in the *United States Monthly Weather Review*, Vol. 47, No. 10, p. 700. Washington, D.C., October, 1919.

Four diagrams, computed from data for yield of wheat and temperature and snowfall in Illinois, and showing the yields of winter wheat and the snowfall, mean and lowest winter temperatures in the preceding winters, with respect to the average of these features for the period of record, are presented. It is stated that considering only the elements of total snowfall and mean temperature, it would appear that the winters of light snowfall are followed by good wheat yields, and the winters of heavy snowfall are followed by light yields. However, this may be due in part to the fact that the temperature is less severe in the winters of light snowfall.

686.—Electroculture Experiments at Llantwit Vadre, Wales³.—I. ALLAN, C. T., *The Electrical Review*, Vol. LXXXIII, pp. 536-537. London. II. ID. *The Electrician*, Vol. LXXXIII, pp. 98-99. London.

The experiments described were carried out by The South Wales Electrical Power Distribution Co., an area of 2.07 acres being used for the purpose. The crop consisted of various kinds of potatoes, and experiments were carried out both in 1917 and 1918. The pressure was stepped up to 32,000 volts and rectified with a Delon type of rectifier which held the voltage to 39,000 in dry weather and 30,000 in wet weather. In 1917 the wires were placed 6 feet apart with cross wires arranged 6 feet apart. The height from the ground was about 6 feet 6 in., afterwards reduced to 5 feet. In 1918 the wires spaced 9 feet apart, with no cross wires, and the network was kept as nearly as possible 2 feet above the haulms. In 1917 the current varied from 2.5 milliamperes in dry weather to 4.0-7.0 in wet weather; in 1918 it varied from 0.35 in very dry weather to 0.8 during heavy rain. Treatment was usually given between the hours of 6 and 9

(2) See also Bulletin of Foreign Agriculture Intelligence, November, 1916.

in the morning and 7 and 10 in the evening. The yield in 1917 showed an increase of 17.2 per cent over the control and in 1918 12.6 per cent, the crop in 1918 being somewhat heavier than in 1917. It is suggested that the decrease may be explained by the smaller area of network in 1918. The cost of the transformer and rectifier was \$1,500. It is estimated that the transformer and rectifier equipment could easily deal with 100 to 150 acres.

The Comparative Rate of Decomposition of Green and Cured Clover Tops in Soil.—SCHOOVER, W. R., in *Soil Science*, Vol. 9, No. 2, pp. 137-149. Baltimore, February, 1920.

Studies on the comparative rate of decomposition of green and of cured red clover tops in soil, conducted at the University of Illinois, are reported. Curing retarded the rate of decomposition as measured by ammonification, nitrification, and loss of carbon in both laboratory and green-house experiments. The green clover produced nitrate very rapidly, with a maximum transformation in the laboratory experiment at 43 days of 35.8 per cent, while with the cured clover at the same period only 15.7 per cent of the nitrogen had been transformed. In the greenhouse experiment the green clover was well in the lead in nitrate production during the first two months. Green and cured red clover underwent the same kind of decomposition under aerobic conditions. With the oxygen supply limited, the types of decomposition of green and cured red clover were vastly different. There was no measureable loss or gain of nitrogen during the experiment. The loss of carbon and the change in the carbon-nitrogen ratios agreed with the other determinations in showing a difference in rate of decomposition between the green and the cured clover, but did not indicate a difference in kind.

The change which dehydration (curing) brought about in the rate of the initial decomposition appeared to be of a physical nature only. An explanatory hypothesis is advanced that dehydration resulted in a hardening and shrivelling of the tissues, which interferes with the reentrance of water and consequently delays the decomposition because the bacteria must await the softening of the tissues before they are able to start their work, while with the green no such delay occurs, as the cells are already hydrated. Planting oats three days after treating the soil with green and cured clover resulted in serious injury which delayed growth. It was greater with the green clover.

Profitable Tomato Fertilizers.—ROSA, T. A., in *Missouri College of Agriculture Experiment Station, Bulletin* 169, p. 12. Columbia, Mo., 1920.

The results of the author's experiments are summarized as follows:

The complete fertilizer produced a marked increase in yields of tomatoes, and the per cent increase is greater on the poorer soils. In these experiments, a mixed fertilizer containing no potash produced practically as good yields as the complete fertilizer. Acid phosphate alone produced a good increase in yield, but not as much as the mixed fertilizers. Nitrate of soda alone and sulphate of potash alone, did not produce a large increase in any of these tests, and in some cases decreased yields through injury to young plants.

Stable manure and poultry manure were found to be excellent fertilizers for tomatoes, although these materials did not stimulate early maturity to as great an extent as did the 4.6-8-7 and 5-8-0 commercial fertilizers.

Mixed fertilizers, and acid phosphates alone, produced a striking increase in the amount of early fruit, the plants reaching quantity-production four weeks earlier than plants on unfertilized check plots. It seems that fertilizers stimulate plants to rapid growth during the early part of the season, resulting in a large plant, capable of bearing many fruits. This is particularly important in Missouri, where the latter part of the summer is usually unfavourable for plant growth.

As a result of the tests reported in this bulletin, it would appear that tomato growers could profitably increase the yield and earliness of the crop, by the use of at least 250 pounds to the acre of a commercial mixed fertilizer. It is suggested that a fertilizer analyzing 3 or 4 per cent nitrogen and 10 to 12 per cent phosphorous be used for tomatoes.

The Protein Content of Wheat Grown with Irrigation.—JONES, J. S., COLVER, C. W., and FISHBURN, H. P., in *The Journal of Agricultural Science*, Vol. 10, Part 3, pp. 290-332. London, July, 1920.

The author concludes that growers and millers are not right in assuming that low-protein wheat necessarily results from the practice of irrigation. As a matter of fact irrigation is not the controlling factor in determining what shall be the protein content of the harvested grain.

Irrigation projects produce large amounts of wheat from raw sagebrush soils whose content of available nitrogen is always low, resulting in the production of low protein wheat. A much better quality of grain is possible as soon as it is brought into rotation with alfalfa or red clover.

(*) See also *Agricultural Gazette*, May 1920, page 447

The climate of the irrigation sections is favourable, and the essential soil conditions for high protein wheat are easily within the control of the irrigation farmer.

However "deteriorated" in quality a really good variety of milling wheat may be from growth with irrigation on soils depleted of available nitrogen, seed from it will respond with the production of maximum amounts of protein for the variety if given the favourable conditions of growth available. There is nothing to be gained by importing seed of that variety from distant localities.

There is much to be gained, however, by irrigation farmers from the more rigid selection of varieties on the basis of well-recognized milling value. The results of the investigation show that the irrigation farmer can grow the highest quality of the hard red spring wheats. The white wheats will also respond to favourable conditions for protein elaboration.

Continuous Wheat Growing.—*Journal of the Ministry of Agriculture*, Vol. 27, No. 6, pp. 502-504. London, 1920.

It has long been a tradition of farming that two white-straw crops should not be grown in succession, and the tradition still lives although it is generally known that there are numerous cases in which the practice has been a success. The classical proof that white-straw crops can follow one another without deterioration of the land is afforded by experiments at Rothamsted Experimental Station, where wheat has been grown continuously on the same land for 73 years, with only two seasons' break for fallow, and barley has been grown for 63 years with only one season's fallow. In similar experiments at Woburn, on a much lighter soil, forty-four crops of wheat have been taken off the same land without any break, and forty-four crops of barley off the barley plots. As a commercial proposition, wheat was grown almost continuously for 50 years on Mr. Prout's land at Sawbridgeworth. Other instances are also known, particularly on chalky boulder clay, where wheat has been grown for a succession of years on the same land, and it may be taken as proved that the practice is quite feasible.

In the case of the continuous wheat crops at Rothamsted there has, of course, been a falling off on the unmanured land, but this is less than might have been expected; for the last 40 years the yield has been fairly steady, and has averaged $11\frac{1}{2}$ bushels, against $17\frac{1}{2}$ bushels for the first five years of the experiment. The plot supplied with farmyard manure shows no falling off, but on the contrary, a rise; for the first eight years the yield averaged 28 bushels, and the last ten years 35 bushels. Except in a few really bad years, such as 1879, 1904 and 1912, the crop has been consistently good; while often, as in 1892, 1893 and 1900, it has still been

good in spite of the big drop in the average yields for the whole country. The most interesting plot for the present purpose, however, is that supplied with complete artificials. For the first 30 years the yield was well above that on the dunged plot. It has fallen off since, but it was maintained for a sufficiently long period to show that no falling off need be anticipated in practice.

585.—Montgomery Seedleaf, a New and Very Productive Tobacco Hybrid Obtained in Ohio, U.S.A.—HAUSER, T., in *The Journal of Heredity*, Vol. IX, No. 8, pp. 354-356. Washington, D.C.

In a series of tobacco hybridization and selection tests made at the Ohio Agricultural Station in 1903, the hybrid Montgomery Seedleaf, obtained from the cross Washington (Ohio) Seedleaf \times Big Graham, proved much superior to the ordinary varieties of tobacco. It differs distinctly from its parents, both of which have drooping leaves, by its straightness. Its height (above that of a man) and vigorous vegetation make it very productive; it often gives yields exceeding 3,000 lb. per acre. Another valuable quality is its resistance to drought. It is true that excessive drought hinders flowering, but when it is over the plant grows with a new vigour. This tendency sometimes makes it necessary to top it before the floral buds form.

This new variety, already adopted by tobacco growers in south-west Ohio, was awarded first prize in a competition in which seventy other varieties were entered.

LIVE STOCK AND BREEDING

616.—Researches on Infectious Anaemia of the Horse, in Germany.—FROHNER, E., in the *Monatshefte für Praktische Tierheilkunde*, Vol. xxix. Pt. 9 and 10, pp. 385-405. Stuttgart, 1919.

Study on infectious anaemia of the horse including clinical observations, macroscopical and microscopical diagnosis (examination of the blood) and infection experiments by intravenous injections and by direct contact.

It is shown that infectious anaemia of the horse is a septicaemia *sui generis* that the healthy horse can contract by intravenous injections. The etiology of the disease is still obscure. It still remains to be settled whether the infectious anaemia that was so widespread on the east front of military operations in 1917 and 1918 was the same as that observed in the west and in France, America and Japan. Observations made in the last two countries assign a part in the infection to tabanids and stomoxys; the infectious anaemia in the west (France, Alsace-Lorraine and the Rhenish provinces) is distinguished by its highly contagious character in the stables and is apparently due to an ultramicroscopic virus.

The result of the author's researches seem to destroy the hypothesis that the disease observed in the western regions is one and the same and also the hypothesis of an eventual relationship between the presence of larvæ of *Gastrophilus* and the disease.

The infectious anaemia of the horse is not related in any way with the pernicious anaemia of man. The diagnosis of the disease is extremely difficult; according to the author, the only sure way of diagnosing it consists in intravenous injections in experimental horses. Differential diagnosis is also very difficult; the term "infectious anaemia" is often used for different secondary anaemias in no way related to true infectious anaemia. Horses suffering from mange, glanders, intestinal catarrh, infection with helminths, etc., are often stated to be suffering from the disease in question.

619.—The Mineral Elements in Animal Nutrition.—FORBES, E. B., in the *Scientific American Supplement*, No. 2257, pp. 218-219. New York, 1919.

The author studied the chemistry of food-stuffs and made practical experiments on metabolism with pigs and dairy cows. The results are given in detail in the article in the Institute Bulletin. The conclusions relating to the mineral metabolism of dairy cows are as follows:

Dairy cows greatly surpass all other breeding animals by the rapidity and intensity of their production of proteid and mineral foods and, consequently, in their food requirements. This is generally recognized with respect to their protein requirement. The author's experiments have proved that there is no justification for the belief that no attention need be paid to their requirement in mineral elements. He found that an abundant milk production obtained by common winter rations fed in quantities sufficient to maintain live weight and produce an ample and regular accumulation of nitrogen and sulphur, causes heavy, continual losses in the calcium, magnesium, and phosphorus of the frame in spite of an ample supply of these in the ration. The limited response of cows to a large increase in the quantity of these foods absorbed seems to show that an improvement of dairy cows for milk production by selection has exceeded the capacity of the animal to digest mineral foods.

A strong metabolism of silicon was shown. An excess of inorganic acids over inorganic bases, largely due to the silicon in timothy hay, caused an acid reaction and an increase in the amount of ammonia in the urine.

The incapacity of the best dairy cows to maintain mineral metabolism unless pasture is available must be a general phenomenon. It is probably to this that the frequent incapacity to maintain an exceptionally high yield during two consecutive lactation periods must be attributed, as well as the

frequent inability to breed after a period of forced milk production.

Cows' rations should supply plenty of calcium, magnesium, and phosphorus, both during and between the lactation periods.

These studies emphasize the importance of liming and the cultivation of leguminosae in agriculture.

AGRICULTURAL INDUSTRIES

Experiments With Flax on Breaking.—CLARK, C. H., in *United States Department of Agriculture Bulletin* 883, p. 29. Washington, D.C., 1920.

European seed-flax varieties have proved superior to others for the conditions obtaining in the semi-arid sections of the North-Central States. The true seed types rather than the short-fibre types are most productive. In the experiments at Mandan the Reserve (C.I. No. 19), Damont (C.I. No. 3), Frontier (C.I. No. 17), and North Dakota Resistant No. 52 varieties have yielded most and are the best known and most widely distributed varieties in this group.

North Dakota Resistant No. 114, while one of the two varieties significantly low in yield in this experiment, is the only variety which possesses superior resistance to flax wilt (*Fusarium lini*). It is not particularly adapted to semi-arid conditions, but is recommended for the more humid sections of the Dakotas and Minnesota where flax is grown in rotation with other crops on old land.

Nursery experiments indicate that favourable results can not be expected from new importations in comparison with acclimated seed, particularly if selected domestic strains can be procured. Russian and northern European strains which have undergone natural or scientific selection toward a high seed-producing type are those best adapted for semi-arid conditions in the Northwest. Commercial growers should not risk large acreages with Argentine seed, and the growing of Indian, Abyssinian, or south-European seed in this area can only result in total failure.

If the preparation of the land has been thorough and a good seed bed is obtained, 20 pounds of flax to the acre seems to be a sufficiently heavy rate of seeding. Heavier seeding may be preferable under certain conditions, such as a seed bed so dry that germination is uncertain. The results obtained do not indicate much advantage in heavier seeding, however, and the high price of seed flax discourages the practice.

Early seeding is recommended on breaking. The land should not be left to dry out after the seed bed is prepared. It is desirable to follow the plow, disk harrow, or packer immediately with the drill if breaking is done in the spring. Land backset the

previous fall should be disced before seeding in order to kill weed growth and improve the seed bed. The best results can be expected from seedings made from May 1 to June 10. A rapid decrease in yield from sowings made after June 10 can be expected.

How do Bacteria Get Into Milk at the Farm and How May Their Number be Reduced?—PRUCHA, H. A., in *Journal of Dairy Science*, Vol. 3, No. 4, pp. 308-313. Baltimore, Md., 1920.

The high germ content of city milk has been the occasion of much alarm for the past thirty years. Many cities have attempted to meet the situation by declaring that milk containing more than some definite maximum of bacterial life should be excluded from the retail market.

At the beginning of the studies concerning the sources of the bacteria added to milk, there was a general feeling that the character and condition of the barn was mainly the responsible factor. Investigation proved that this was not the case. It was found that at least 80 per cent of the germ life getting into milk comes ordinarily from the utensils in which the milk is handled, especially the milk cans. During hot weather milk cans normally contribute 30,000 or more bacteria per cubic centimetre to the fresh milk.

This high germ content of the milk cans is ordinarily due, not to failure to properly wash and rinse the cans at the milk plant, though improvements at this point are undoubtedly needed in some cases, but primarily to the growth which takes place in the cans after the washing process.

The amount of growth occurring in the milk cans between the time they are washed and the time they are filled with milk depends upon the temperature, the amount of moist area within the cans and the length of time which elapses before the cans are used. Of these factors the moisture of the can is the only one which can be successfully controlled.

A thorough drying of the cans before they leave the milk plant will exert a profound influence upon the germ content of the milk later returned to the plant in these cans.

Where moist cans are returned to the producer he may put them into acceptable condition by thoroughly rinsing them with scalding water. If they are not to be used immediately, they should be promptly and thoroughly dried.

The Production of High Grade Milk With Milking Machines Under Farm Conditions.—*New York Agricultural Experiment Station Bulletin* 472, pp. 27, Geneva, N.Y., February, 1920.

In order to determine whether the cleaning methods for milking machines found successful at the Geneva Experiment Station were

practical for the average dairyman, and applicable to types of machines other than the one in use at the Station, these methods have been tested at two dairies sending milk into Geneva. Conditions have also been observed at a third dairy where the dairyman had used methods of cleaning which produced good results.

The quality of the milk produced by the dairies previous to, and later than, the work described here was determined from the records of the bacteriological examinations made by the persons in charge of the milk inspection work for Geneva. These records were based upon a determination of the approximate numbers of bacteria present in the milk as brought to the city.

Trouble had been experienced at Farm A. in continuously producing a milk with a low germ content. A ten-day visit was therefore made to this farm during which time the author observed conditions, and introduced cleaning methods similar to those used at the Station. Numerous tests of the milk showed that at this farm, at this time, the chief trouble arose from a failure to scald and dry metal utensils properly. The milking machine tubes were reasonably clean, and were kept in a solution of brine and chloride of lime which was in satisfactory condition, though various details in the care given the tubes could have been improved. Improved methods were introduced with the result that, so long as the care of the machines remained under observation, all cans of milk sent to Geneva were found to have a low germ content. During the seven months that have elapsed since the visit was made, the quality of the milk from this farm, though variable, has been better than it was previous to the visit. Observations lead the author to believe that the fluctuations in quality were due to a failure on the part of the dairyman to attend to all of the essential details of the cleaning process.

Trouble had also been experienced at Farm B. in producing a high grade milk, and an eight-day visit was made to study conditions. Investigation showed that there were many possible sources of trouble at this place, beginning with poor cleaning of the teat-cups and tubes, pails and other utensils. In addition, the sterilizing solution used for the rubber tubes was weak both in salt and in chloride of lime, while the milk was not cooled satisfactorily before shipping. The introduction of better methods of cleaning and caring for the utensils largely removed the difficulty, though this was not cleared up entirely until the milk was cooled more efficiently. So long as these things were under control, the milk reached the city with a low germ content even though it was shipped 27 miles without icing and was never cooler than 62° F.

A description of conditions at Farm C. is also included because at this farm the

dairyman himself had adapted the Station methods of cleaning machines to his own conditions so successfully that he had maintained an almost perfect record for producing milk with a low germ content. This record corresponded with the excellent record maintained by the same man during periods when his herd was milked by hand. Some difficulty which he experienced during the spring of 1919 disappeared following the use of a sterilizing solution for the teat-cups and tubes which contained salt as well as a strong solution of chloride of lime. Great care was maintained at this farm at all times to keep the machines as well as all other milk utensils in a cleanly condition.

The chief conclusions to be drawn from the observations are: that the methods of cleaning are more important than the type of the milker in determining the germ content of the milk, and that high grade milk can be produced with the milkers under observation provided they are cleaned and cared for twice a day for 365 days in the year by methods known to give good results. Success cannot be attained, however, by doing the work in a half-hearted way. The neglect of any one of several important details in the cleaning process may make all the difference between success and failure.

The Lecithin Content of Butter and Its Possible Relationship to the Fishy Flavour.
(1).—SUPPLEE, G. C., in *New York Cornell Agricultural Experiment Station, Memoir* 29, pp. 101-151. Ithaca, New York, 1919.

The data presented in this paper show beyond a doubt that there is in normal butter a sufficient amount of lecithin to yield, on decomposition, small quantities of trimethylamine, and it is shown also that small quantities of this substance are essential for the manifestation of a fishy odour. Furthermore, it is shown that when this substance is worked into butter under the proper conditions, it produces a flavour described as fishy. These results are most uniform when trimethylamine butyrate is used. An associative fermentation in butter or in cream, with the ultimate formation of this substance, is quite possible. As to whether or not this or some other volatile and unstable combination of trimethylamine is the cause of the natural fishy flavour, remains to be shown more conclusively. Certain data do indicate that trimethylamine is found in some samples of fishy-flavoured butter but not in others. Although it is possible that its presence is incidental in such samples, that is not believed to be the case. In this connection it is worth while to call attention to the confusion between the fishy, oily, and metallic

flavours when they are present to only a slight degree. It seems possible that the initiation of the development of these flavours depends on a common fundamental factor. Whether or not any particular one of them develops to its typical flavour would depend on the presence of certain conditions which were specific for that flavour. With this possibility in view, it would be logical to assume that trimethylamine is responsible for the typical herring, or mackerel, flavour and odour in butter, and that the absence of this substance would result in the manifestation of similar but non-typical flavours.

There seems to be no doubt that the presence of a definite acid condition in the butter is essential for the development of the fishy flavour. This condition is best obtained when butter is made from cream containing lactic acid, regardless of whether this is developed by bacteria or added to the cream in the form of the commercial product. Furthermore, the results indicate that, while a definite acid solution is essential, it must be accompanied by some other equally important factor. The data show that this factor is determined by biological agencies. It appears that both these factors must exist in a definite and delicate relationship, and that if the proper equilibrium is disturbed, the characteristic flavour is not manifest. Numerous results and observations indicate that the unknown transient factor is trimethylamine.

The bacteriological aspects of the problem seem to involve the determination of the relationship already mentioned. It is shown that the acid value of butter is to a certain extent regulated by biological factors, probably enzymes. It is shown also that trimethylamine may be produced in milk and in cream, probably to some extent from lecithin, with the consequent production of the fishy flavour in those products. Furthermore, it is shown that *Bacterium ichthyosmius*, which produced the flavour in those substances, would produce the flavour in butter also under certain conditions. It would therefore seem possible that other species of microorganisms might bring about the same type of change. It seems highly probable that the growth of bacteria in the cream before it is made into butter determines the conditions necessary for the later manifestation of the fishy flavour.

The data dealing with lecithin as the source of trimethylamine in milk products are too meagre to warrant definite conclusions at this time. However, the results presented herein, taken together with what is known regarding this substance, indicate that this is one of the most logical sources.

(1) See also *Agricultural Gazette*, September 1920, page 774.

PLANT DISEASES

Genetics of Rust Resistance in Crosses of Varieties of *Triticum Vulgare* With Varieties of *T. Durum* and *T. Dicoccum*.—HAYES, H. K., PARKER, J. H., and KURTZWEIL, C., in *Journal of Agricultural Research*, Vol. 19, No. 11, pp. 523-542. Washington, D.C., 1920.

Recent studies of the parasitism of the black stemrust of wheat (16, 18, 21-24) have shown that there are many biologic forms of *Puccinia graminis* which can be differentiated only by their action on pure line wheat hosts. This seriously complicates the breeding of wheat for rust resistance. In the light of this knowledge differences of infection of certain crosses in 1917, as compared with 1916 or 1918, show that the conflicting results may be explained logically by supposing that more than one biologic form was present in the rust nursery in 1917.

Sterility is a factor which must be considered in a study of crosses between common wheats and durum or emmer varieties. Sterility was shown in three ways: (a) pollen abortion; (b) the fact that F_1 florets of durum-common crosses set nearly 50 per cent less kernels than the parent sorts, while F_1 emmer-common crosses produced about 25 per cent of barren florets; and (c) the large number of natural crosses which occurred in some F_2 plants as shown by the F_3 results.

Crosses between durum and common wheats produced many different forms in the F_2 generation, such as compact keelless commons resembling club wheats, lax sharply keeled durums, both emmer and spelt, as well as types which resembled the poulard group. Lax and compact durum, common, and emmerlike forms were obtained which bred true to the F_3 generation. The segregation in the F_2 generation of emmer-common crosses was not so wide as in the durum-common cross, although both lax and compact keelless wheats which bore naked kernels, as well as lax and compact wheats with adherent-glumed kernels, were obtained.

The study of inheritance of rust resistance was made in a specially prepared disease plot. Because of the conflicting results of 1916 and 1917 all barberry bushes were removed early in the spring of 1918 from the immediate vicinity of the rust plot and the epidemic was induced with a known form of rust. The data on rust infection are based on these 1918 results.

The following species and varieties were used in the study: *Triticum vulgare*, varieties Preston, Marquis, and Pioneer; *Triticum durum*, varieties Acme, D-4, Kubanka (C I 2094) and Iumillo (C I 1736); *Triticum dicoccum*, White Spring emmer (Minnesota 1165 and C I 1524.)

The three common wheats were susceptible, the durums were commercially resistant, Kubanka (C I 2094) being somewhat less resistant than Iumillo (C I 1736), while Acme and D-4 were slightly more resistant than either of the other durum sorts. The emmer varieties were very resistant, Minnesota 1165 being practically immune.

The F_1 generation of crosses between durum and common varieties was as susceptible as the common parent, while F_1 crosses between the practically immune emmer parents and susceptible commons were about as resistant as the durum varieties. Thus, in the cross where emmer is one parent, resistance is partially dominant, while in the durum-common cross susceptibility is completely dominant over resistance.

Each F_2 plant which produced viable seed was tested in the F_3 generation for both rust infection and botanical characters. These F_3 notes were used to determine the genotypic nature of individual F_2 plants. In the crosses between durum and common in which Marquis was the female parent, 404 F_2 plants were tested in the F_3 generation and no rust-resistant common wheats were obtained. Likewise, no plants in the F_3 generation seemed especially promising for both common wheat characters and rust resistance. In the crosses in which durum was the female, one or two F_2 common-headed plants were resistant; but their progeny were worthless from a practical agronomic standpoint. In one F_3 family which was grown from a susceptible F_2 plant, a number of resistant, vigorous plants were obtained which had common head characters. There is an indication of linkage of durum or emmer characters and rust-resistance, since the production of rust-resistant durums or emmers in the F_2 and F_3 generations is comparatively easy and the production of resistant common wheats much more difficult.

Resistant and susceptible plants obtained either in the F_2 or F_3 generation from crosses of durum and common parents were selected. Resistant and susceptible common, emmer, and durum wheats were available for this study. Greenhouse inoculation studies with a known strain of *Puccinia graminis tritici* showed that durum, common, and emmer type plants were obtained in the F_2 or F_3 generation which were more resistant than the resistant durum parents. Thus, we have transgressive segregation for rust resistance.

The number of plants available for a study of inheritance between resistant emmer parents and Marquis was not very great. In the F_3 generation several lax-headed wheats were obtained which had the head shape and naked kernels of common wheats and which were rust-resistant. This shows that rust-resistant common wheats can be obtained by crossing susceptible common varieties with resistant emmers.

The mode of inheritance of rust resistance seems entirely comparable with the general Mendelian manner of inheritance of botanical and morphological characters. The technic of breeding for rust resistance is similar to that of breeding for agronomic characters.

White Pine Blister Rust Control in 1919.—

DETWILER, S. B., in *American Plant Pest Com. Bulletin* 4, pp. 1-12, 1919.

The Fifth Annual International Blister Rust Conference was held at Albany, N.Y., December 8-9, 1919, under the auspices of the American Plant Pest Committee. Foresters and pathologists representing the New England States, New York, Pennsylvania, Wisconsin, Minnesota, and Canada were present.

In a summary of the report of this body it is stated that experiments conducted on an extensive scale since 1916 show that white pine blister rust can be controlled locally by destroying wild and cultivated currant and gooseberry bushes within a comparatively short distance of the pines, 200 to 300 yards being sufficient to prevent serious damage under average forest conditions. This reduction of 50 per cent in the minimum width of the safety zone hitherto recommended is based on four years' scientific and practical field studies.

Unskilled labourers can be quickly taught to remove at least 95 per cent of the wild currant and gooseberry bushes in going over the ground once. Wild currants and gooseberries do not reproduce rapidly in an area that has been worked by an efficient crew. Bushes missed by the crews are usually small plants growing in underbrush, having less leaf surface than the average plant and causing proportionately less damage. On four control areas worked in 1916-17 no new pine infections could be found in 1919. The cost per area of destroying these bushes has been considerably decreased.

Blister rust infection on pines in the Northeastern States is increasing rapidly. Timber owners in infected regions who permit currant and gooseberry bushes to grow within 200 to 300 yards of the white pine suffer severe loss. Cultivated black currants are especially susceptible to blister rust, but all kinds will cause serious damage to pines. White pine blister rust has not been found in the western half of the United States or in Western Canada, where wild currants and gooseberries are abundant.

INJURIOUS INSECTS

The Pea Moth: How to Control it.—FLUKE, C.L., in *Wisconsin Agricultural Experiment Station Bulletin* 310, pp. 12. Madison, Wis., 1920.

A pea moth which feeds within the pods on ripening peas and appears to be a species

distinct from the European pea moth (*Laspeyresia nigricana* Steph.) occurs in the northeastern counties of Wisconsin and threatens the pea industry of the state. This insect is said to have been one of the principal pests of peas in Canada since 1893, having been introduced from Europe about that time, and has been reported from Michigan, but is not known to occur in any other state. The date of its introduction into Wisconsin is not known, but most of the Door County farmers seem to agree that they first observed the insect about 14 years ago.

The percentage of infested pods ranged from 2 to 21. The infestation of the previous year, however, was much heavier, counts showing that 10 to 50 per cent were attacked. It attacks all varieties of both garden and field peas, but no other host than peas is known. Late varieties of peas are more susceptible to attack than the earlier maturing forms, due entirely to the time of appearance of the moth and not to any varietal resistance of the peas.

Ten months of the year are spent by the pest in its winter cocoon, the other two months in activity near or on the pea plant. On reaching maturity in the fall the worms leave the pea pods, make their way a short distance into the soil, and construct a strong cocoon composed of soil particles, webbing and gluing them together, and then lining the interior with fine silky threads. Here they remain until late spring, when they change to pupæ, later coming out as adult moths. The moths begin to appear shortly after the pea vines start to bloom, the first moth in the field having been taken on July 14, the largest number on July 18, and the last one July 30.

The eggs are usually laid singly upon the pods (seldom upon very young pods), the leaves, the stems of the pea vines, or even on the stems and leaves of grasses or weeds growing in the pea fields. The first eggs were laid July 17, and a maximum was reached within 2 or 3 days, very few having been oviposited after the first of August. The incubation of the eggs varied from 7 to 10 days, depending upon the temperature. The first egg hatched July 23, and hatching continued until August 13.

When first hatched, the larvæ are pale, with the head and thoracic shield almost black. The full-grown worms are about one-half inch long, yellowish white in colour, and with the spots on the sides of the body rather inconspicuous. The head and thorax are not so dark as when the larvæ are young. The few hairs that appear on the body are short, and pale in colour. Upon hatching out, the young larvæ enter the growing or ripened pea pod through tiny holes which are hard to find after the frass is rubbed or blown off. Here they feed upon the peas,

completing their growth in 16 to 26 days. From one to all the peas in the pods attacked by the larvæ are injured. When partly grown the young worm forms a cocoon within the pods next to the peas, the peas forming one side of the cocoon which is made up of accumulated frass webbed together. The larva then continues feeding, making irregular holes and often devouring as much as half of each pea.

Infested pods are not easy to detect, the only sure method of determining the presence of the worm being by opening the pod. The infestation seems to hasten maturity of the pods and sometimes causes them to blanch prematurely. Upon completing their growth, the larvæ leave the pods through small holes and seek suitable winter quarters. The larvæ began to emerge from the pods July 31, reached their maximum August 13, and continued to emerge until August 25. If the peas are still in the field, the larvæ enter the soil a short distance and construct their cocoons, thus making ready for the winter season. It often happens, however, that the peas are harvested and placed in the mow ready for threshing before the pea moth larvæ are developed. In that case the worms on emerging find wintering quarters among the old pea vines, or in cracks, crevices, or other suitable places in the barn.

While a single season's experiments have not led to a determination of the best method of controlling this insect, they have led to the recommendation that early maturing varieties be selected and that the planting of the crop be made as early as possible in the spring.

The trap light was found to be ineffective, and spraying is impracticable. The cultivation should be thorough, the peas threshed within a day or two after harvesting and the straw remaining after threshing burned. Any of the vines that have escaped the mower and remain in the field should be raked together and burned. A map is given showing the distribution of the pea moth in Wisconsin and a diagram of its life history at Sturgeon Bay in 1919.

The Western Grass-Stem Sawfly. AINS-LEE, C. N., in *United States Department of Agriculture, Bulletin* 841, pp. 27. Washington, D.C., 1920.

This is an account of the *Cephus cinctus* Norton, a native species which has been gradually coming into prominence by reason of the change which the feeding habits of the larvæ have been undergoing subsequent to its discovery. Originally a grass feeder, it has become a serious menace to the grain growers of the Northwestern States because of its appetite for small grains, within the stems of which it now subsists. It was originally reared by Koebele in California in 1890 from larvæ that were mining in the

stems of native grasses growing in the vicinity of Alameda. It is now known to inhabit the area bounded on the north by a line far into Canada; on the east by the Mississippi river, or probably a little east of that; on the south by latitude 36°; and by the Pacific ocean on the west.

Species of *Agropyron* and *Elymus* appear to have been the original hosts of the larvæ but, since the modification of their feeding habits, 10 plants belonging to other genera including wheat, durum wheat, spelt, rye, and probably barley, are now attacked. Its choice of wheat for food has taken place, so far as known, only in North Dakota and Western Canada, although it is probable that Montana wheat fields have been invaded. From present appearances, the author considers it probable that its attacks will be confined to vegetation growing within the area where spring wheat is sown.

About 50 eggs appear to be laid by a female, the egg being placed within the stem of the host plant, either in the stem cavity or in a hollow excavated by the ovipositor of the female. In order to rear the egg under observation, the author transferred it from the stem to a minute drop of water within a small thin watch glass, which was then immediately inverted on a grass slip and sealed with a ring of water to prevent undue evaporation. In order to continue a requisite moisture supply during a period of several days, it was found necessary to invert over the sealed cell a large watch glass and over this in turn a tumbler. Six or seven days are required for incubation of the egg.

There appear to be 5 larval instars, about 60 days being required for the larval development. When mature, the larva always seeks the extreme base of the stem where it soon begins its preparation for hibernation. It first cuts a V-shaped groove entirely around and inside the stem, usually at or a little above ground level. This groove never severs the root completely, but so weakens it that the upper stalk, swayed by the wind, will break off completely when dry, leaving a stub that is very characteristic of the work of this insect. In this way the larva provides for the easy escape of the adult in the following summer. The length of the stub thus formed varies greatly; in *Elymus condensatus*, it sometimes will project as much as 3 or 4 inches above the ground, while in other grasses, and especially in wheat, stubs easily can be found less than an inch in length in all. The longevity of the larvæ is quite remarkable, at least one larva having lived 3 years and 5 months in stubs set in sand indoors. The duration of the pupa period is not more than a week at the most. By splitting stubs of grass or grain in June, the author has repeatedly liberated adults, which, when free, were able to take instantly to wing. A life history diagram

is given; also a key by S. A. Rohwer for the separation of *C. cinctus* and *C. pygmaeus*.

Plautotropis utahensis Cwfd., which kills the larva after it has formed its hibernation cell, is the most common parasite. It is gregarious, as many as 12 of its larvæ having been taken from a single cell, but 5 or 6 is a more common number. It is estimated that possibly 10 per cent of the *Cephus* larvæ in native grasses in Utah, are destroyed by this parasite, but in Bottineau county, N. Dak., in some localities, it has killed more than 50 per cent of the larvæ in *Bromus* and timothy. But few parasites have been found in the stems of wheat, apparently due to the fact that they have not adjusted their habits to the modified feeding habit of *Cephus*. A braconid, *Microbracon cephi* Gahan, also attacks the larvæ in grass stems and kills them before maturity.

Because of the multiplication of useful parasites, it is probably inadvisable to mow infested grass in midsummer. Burning the stubble in the autumn or spring appears to have little effect upon *Cephus* larvæ, since the inhabited stems have been cut at the ground level or below and are often covered with soil. Plowing from 5 to 6 inches in depth is thought to be the best remedy for the sawfly that can be suggested at present.

A brief reference is also made to *C. pygmaeus*, a well known European species, the habits of which resemble those of *C. cinctus* but which does not occur west of the Mississippi River.

Control of the Sugar-Beet Nematode.—SHAW, H. B., in *U.S. Dept. of Agriculture, Farmers' Bulletin* 772, pp. 19. Washington, D.C.

The sugar-beet Nematode, *Heterodera schachtii*, Schmidt, is found in practically every European country where beets are grown. It has been introduced into the United States and has become well established in the older beet districts in the West, causing the same amount of damage as in Europe. This species is closely related to the root-knot Nematode, *H. radicicola*, the points in which it differs being here described. As soon as the larvæ emerge they search for food, entering the tissues of the rootlet and feeding on the plant juices. They moult twice before transforming into the adult, after which the males at once escape from the rootlet in search of the females. The latter protrude from the rootlet and when fully mature, drop to the ground and die, after which the eggs hatch. Each female is capable of producing from 350 to 400 eggs. On the approach of cold weather or other unfavourable conditions, the females transform into a brown cyst that forms a protective covering for the eggs. These may hatch a few at a time during a period that may extend over several years. This probably accounts for the fact that eelworms have been

known to persist in ground that has been kept free from all food plants for some years. Although cold does not apparently injure the eggs in the cyst, they are destroyed when exposed to a dry heat of 145°F. All other stages succumb to 95°F. This Nematode in all forms may be easily carried from place to place by boots, farm implements, etc. It has also been spread by using, as fertilizers, waste water from the beet washers and mud from the settling pond. Infested plants may be safely given to sheep as fodder, as the Nematodes do not pass through the intestines of sheep alive, but it is not yet known if this is true of other domestic animals.

In addition to feeding on plant juices, this pest causes irritation of the plant cells giving rise to abnormalities of the roots and spots, etc., on the leaves. These appear about the end of July or in August. The food-plants of *H. schachtii* include various crops of economic importance as well as weeds, a list of which is given.

Crop rotation has proved to be the best means of eradicating this pest. A list of non-susceptible plants is given, and beets and other susceptible plants should only be included once in a rotation of about 6 years. If the infested area is small the Nematodes may be destroyed by a liberal application of unslaked lime, which should be well mixed with the infested soil to a depth of about one foot and frequently turned over during the summer. The method of surveying suspected fields is described. Only the females and the brown cysts are visible to the naked eye.

The Gray Garden Slug.—LOVETT, A. L., and BLACK, A. B., in *Oregon Agricultural College Experiment Station, Bulletin* 170, pp. 43. Corvallis, Oregon, 1920.

The garden slugs are a serious pest of truck crops, ornamentals, small fruits, field crops, and greenhouse plants. They are especially injurious in early spring and in the autumn during wet weather.

Young plants are most seriously injured although plants in all stages of development are attacked.

Slugs are likely to be of increasing seriousness as a crop pest due to their great reproductive capacity, their ability to adapt themselves to constantly changing conditions, their tenacious hold on life, and their tendency to associate themselves with man under conditions of intensive agriculture.

Slugs are nocturnal in their habits but are often active in the day time during cloudy, wet weather. During the day they normally conceal themselves under waste materials and in vegetation or borrow in the soil. Dry, hot weather drives them into temporary seclusion and checks their depredations.

Many of the poisons in common use as insecticides are of questionable value in controlling slugs. Bordeaux mixture, either liquid or dry, is an excellent repellent. Calcium arsenate prepared as a bait is readily devoured and is highly toxic to slugs. A combination of a repellent and a poison bait constitutes the most effective control procedure.

In tests Bordeaux mixture 4-4-50 sprayed on the plants combined with the use of a poison bait of calcium arsenate, 1 part to 16 parts chopped lettuce scattered in small heaps over the affected area gave a high degree of efficiency in plant protection and slug control.

1050.—The Highly Toxic Effect of Chloropicrin upon Certain Lower Animals, and the Possibility of Employing this Substance for the Destruction of Parasites.—BERTRAND, C., in the *Comptes rendus hebdomadaires des Seances de l'Academie des Sciences*. Vol. CLXVII, No. 14 (April 7, 1919), pp. 742-744. Paris, 1919.

The great increase that has taken place during the last few years in the number of caterpillars and other plant parasites, owing to a combination of natural conditions as well as to lack of labour and the scarcity of insecticides, induced the writer to try whether any of the lachrymatory or suffocating substances used during the war, could be employed for controlling these agricultural pests.

Chloropicrin is one of these substances, and has proved especially suitable for the purpose, for it is an industrial product that can now be obtained in large quantities, it keeps well, and, as will presently be shown, it is extremely effective.

It is produced by the action of chloride of lime upon picric acid, or upon the residue left after making that acid, and is a liquid with a high refractive index, and a density of 1.666 at $+16^{\circ}\text{C}$. Its boiling point at a pressure of 766 mm. is $+112.3^{\circ}\text{C}$. Chloropicrin, however, evaporates very easily, as it has a high vapour tension; the writer found this to be 30.2 mm. at $+15^{\circ}\text{C}$. It is not inflammable. It is only slightly soluble

in water; according to a determination made by the writer only 1.65 gm. dissolve in a litre at $+18^{\circ}\text{C}$. When much diluted in the air, chloropicrin has a slightly acromatic and pungent smell; when more concentrated, it soon becomes extremely irritating to the eyes and respiratory passages. It has therefore both lachrymatory and suffocating properties, and further, produces a violent cough on inhalation. Certain precautions are necessary in handling chloropicrin, but on account of its aggressive nature, it is quickly perceptible, and when much diluted is innocuous, therefore it is much less dangerous to a man than hydrocyanic acid for instance, for which, perhaps, it could sometimes be used as a substitute.

The author tried the effect upon a number of insects of chloropicrin diluted in the air in known proportions, and carried out a series of experiments, in order to ascertain the minimum fatal dose for each species. In these experiments, he took into account the length of time that the animal was exposed to the vapour, for, to a certain extent, the toxic action increases with the length of the exposure.

The insects experimented upon were the caterpillars or larvæ of lepidoptera (the vine, pyralid, the eudemis of the grape, the lackey moth (*Bombyx neustria*), of trees, etc.) the larvæ of hymenoptera (the poplar sawfly) and aphids (the aphids of the Japanese spindle-tree).

From the total data obtained from these experiments it was found that the aphids were killed either immediately, or in some hours, by being placed for from 5 to 10 minutes in an atmosphere containing only from 1 cgm. to 2 cgm. of chloropicrin per litre. A concentration of half this strength was also very efficacious, at least as regards the larvæ. The latter stopped feeding, lost their strength and power of movement, and finally died in from 24 to 48 hours after their exposure to chloropicrin vapour.

There is thus every reason to suppose that fumigating or spraying with chloropicrin (either in the form of an aqueous solution, or an emulsion) might prove a good method of controlling certain parasites of cultivated plants.

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AGRICULTURAL STATISTICS

THE WHEAT CROP OF 1920

The following table gives the official estimates of the production of wheat in 1920 for the countries which have reported to the Institute. The figures for 1919 and the average of the five previous years are given for comparison.

Countries	1920	1919	Average 1914-18
	Bushels	Bushels	Bushels
EUROPE:			
Belgium.....	9,050,000	9,895,000	7,935,000
Bulgaria.....	41,190,000	34,029,000	29,308,000
Spain.....	134,457,000	129,251,000	137,221,000
Finland.....	276,000	306,000	231,000
France.....	230,416,000	182,446,000	214,138,000
England and Wales.....	61,600,000	63,808,000	64,483,000
Italy.....	146,975,000	169,771,000	167,991,000
Sweden.....	10,688,000	9,509,000	8,707,000
Switzerland.....	3,586,000	3,524,000	4,205,000
Total, Europe.....	638,138,000	602,539,000	634,219,000
ASIA AND AFRICA:			
India.....	376,880,000	280,485,000	352,837,000
Algeria.....	13,902,000	19,166,000	33,191,000
Egypt.....	27,246,000	30,137,000	34,186,000
Tunis.....	4,766,000	6,981,000	7,047,000
Total, Asia and Africa.....	422,794,000	336,769,000	427,261,000
NORTH AMERICA:			
United States.....	750,648,000	940,987,000	822,246,000
Canada.....	293,361,000	193,260,000	248,084,000
Total, North America.....	1,044,009,000	1,134,247,000	1,070,330,000
GRAND TOTAL.....	2,104,941,000	2,073,555,000	2,131,810,000

WHEAT ACREAGE IN THE SOUTHERN HEMISPHERE

The areas sown to wheat for the coming crops in the Southern Hemisphere are given below.

Countries	1920-21	1919-20	Average 1914-15 to 1918-19
	acres	acres	acres
Argentina.....	16,062,000	14,957,000	16,566,000
South Africa.....	823,000	801,000	841,000
Australia.....	11,500,000	6,344,000	10,400,000
Totals.....	28,385,000	22,102,000	27,807,000

CROP CONDITIONS IN THE SOUTHERN HEMISPHERE

Argentina.—The weather was very dry during the last part of August and until late in September when the drought was broken. Good rains have fallen since and the outlook for wheat is considered satisfactory. An exportable surplus of nearly 100,000,000

bushels was forecasted by Broomhall on October 12.

Australia.—Up to October 15 the weather was favourable and crop prospects were good. The surplus available for export was forecasted as 80,000,000 bushels.

LIVE STOCK STATISTICS

ENGLAND AND WALES

Classification	June 4, 1920	June 4, 1919	Increase (+) or decrease (—)	
			In number	Per cent.
Horses.....	1,365,940	1,386,820	— 20,880	— 1·5
Cattle.....	5,546,900	6,194,540	— 647,640	—10·5
Sheep.....	13,378,970	15,124,310	—1,745,340	—11·5
Swine.....	1,994,740	1,798,470	+ 196,270	+10·9

TUNIS

Classification	Feb. 28, 1919	April 30, 1918	Increase (+) or decrease (—)	
			In number	Per cent.
Horses.....	78,864	35,831	+ 43,033	+120·1
Mules.....	31,324	16,236	+ 15,088	+ 92·9
Asses.....	198,564	84,639	+ 114,015	+134·7
Cattle.....	634,823	251,490	+ 383,333	+152·4
Sheep.....	2,661,579	1,124,998	+1,536,581	+136·6
Goats.....	1,660,621	548,912	+1,111,709	+202·5
Swine.....	17,681	14,596	+ 3,085	+ 21·1
Camels.....	170,606	105,037	+ 65,569	+ 62·4

GERMANY

Classification	June 1, 1920	Mar. 1, 1920	June 2, 1919
Cattle.....	16,981,522	16,444,725	16,381,605
Sheep.....	7,021,342	6,241,726	6,162,794
Goats.....	11,656,813	9,430,268	8,610,786
Swine.....	4,967,537	3,781,750	4,679,419

THE GENERAL ASSEMBLY OF THE INTERNATIONAL INSTITUTE OF AGRICULTURE

The General Assembly of the International Institute of Agriculture met at Rome on November 3. Mr. T. K. Doherty, LL.B., Canadian Commissioner of the Institute, was appointed by the Department to represent Canada at the meeting. Mr. Doherty also attended the Conference on the international organization of the campaign against grasshoppers, held at Rome on October 28.

Perhaps the most important question to be discussed by the General Assembly is that of the relations of the Institute with the League of Nations. It has been proposed that the Institute shall join the League.

Other subjects to be dealt with are: The international organization of agricultural meteorology; agricultural book-keeping, and the results of the investigation on the organization and working of rural book-keeping institutions in different countries; the application and coming into force of the International Convention concerning phytopathology; the programme of researches and studies with reference to plant diseases and pests to be taken up by the delegated specialists of the adhering states; amelioration of the social condition of agricultural labourers; and measures adopted by the different States for the purpose of increasing agricultural production.

BOOKS WANTED BY THE LIBRARY OF THE INTERNATIONAL INSTITUTE BRANCH

The International Institute Branch Library desires to purchase the following publications:

Phytopathology: Vol. 4, Nos. 1 & 4; Vol. 5 Nos. 2 & 3; Vol. 6, Nos. 1, 2, 3 & 5. Index to Vols. 4 & 5.

Experiment Station Record: Vol. 2, No. 2; Vol. 3, Nos. 3 & 4; Vol. 4, Nos. 1 & 12.

Farmers' Bulletins: Nos. 1, 4, 13, 19, 191, 199, 214, 315.

U.S.D.A. Report of the Secretary of Agriculture, 1910.

Journal of Heredity: Nov. 1914 and Index to Vol. 5.

American Breeders' Magazine: Vol. 1, 1910. Index. Vol. 3, No. 2. Vol. 4, Index.

Grain Growers' Guide: Vols. 1, 2 & 3, and Sept. 6, 1916.

Journal of Agriculture and Horticulture (Quebec): Issues before 1912.

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December, 1920

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE

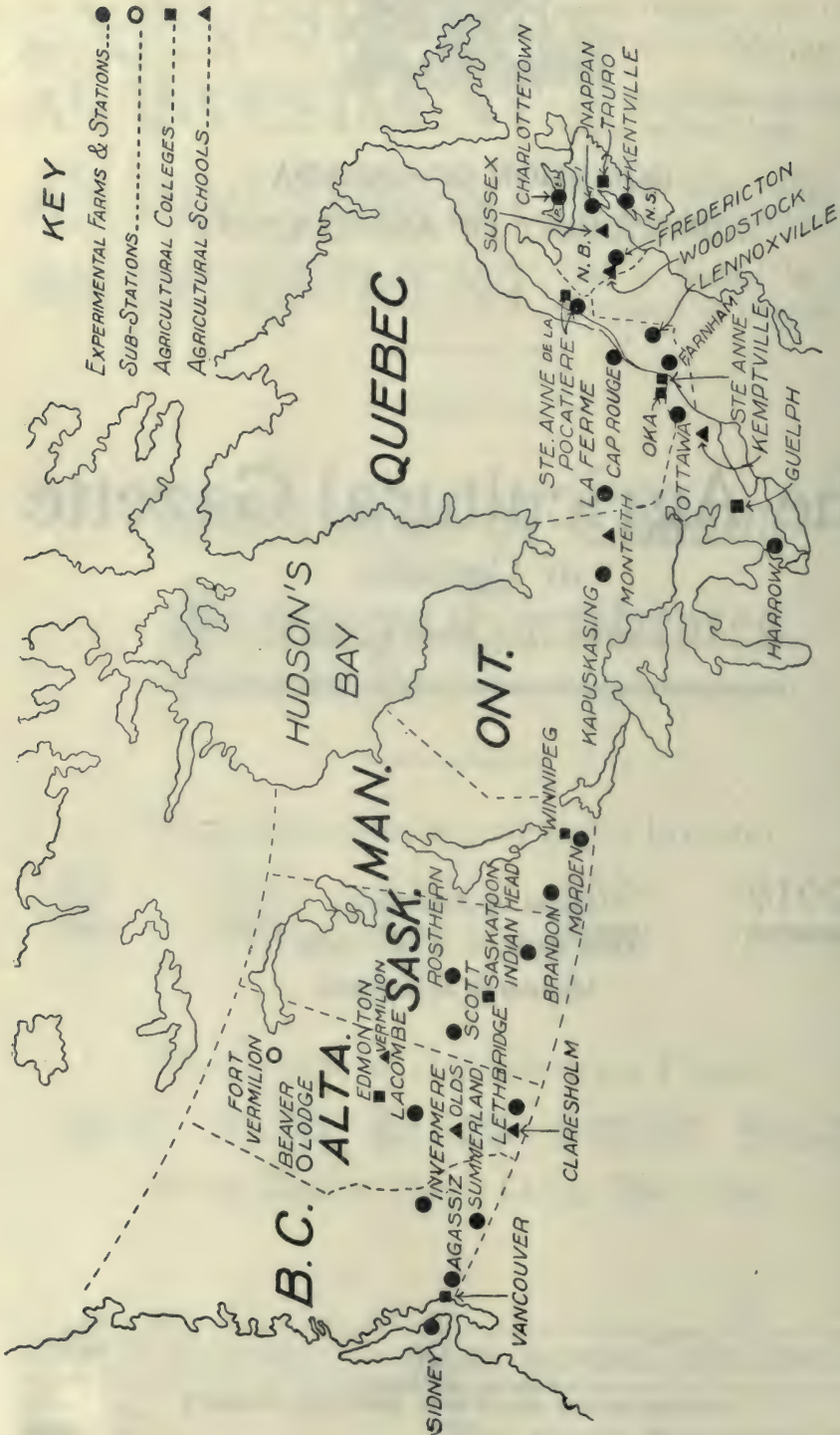
The Agricultural Gazette of Canada

EDITOR: J. B. SPENCER, B.S.A.

Issued by direction of
THE HON. S. F. TOLMIE
Minister of Agriculture

27-

OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920



MAP OF CANADA SHOWING THE LOCATIONS OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

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THE AGRICULTURAL GAZETTE of Canada is published monthly, in English and in French, by the Dominion Department of Agriculture. It is not intended for general circulation. A limited number of copies, however, are available to subscribers at \$1.00 per annum, or 10 cents per copy.

Subscriptions should be forwarded to the Editor, Agricultural Gazette, Ottawa.

THE AGRICULTURAL GAZETTE AND ITS SCOPE

WITH this number *The Agricultural Gazette of Canada* completes its seventh volume. Since its inception seven years ago a faithful endeavour has been made to carry out the policy then determined upon: First, to give publicity to the activities of the various branches of the Dominion Department of Agriculture; Second, to make known the activities of provincial departments; Third, to aid, foster, and emphasize the objects sought to be accomplished under *The Agricultural Instruction Act* of the Dominion, including the development of agricultural extension, of agricultural education and the advancement of country life in general.

The Agricultural Gazette was never intended to be a competitor with other agricultural journals and never has been. Its material has always been at the disposal of the entire press of the country to be used with or without credit. In short it has been and is an official publication intended for persons interested in the development of agriculture in its economic and social aspects.

During its existence the Gazette has been contributed to by all leading officers and experts of every Department of Agriculture, Dominion and provincial. It has made public a vast amount of information on practically every phase of agriculture, every phase of agricultural education and every phase of social welfare work affecting the rural community. It has, in particular, dealt with the advance and development of co-operation, marketing, the provision of financial credit, the cultivation of the soil, the breeding of live stock, the improvement of seed, the control of diseases of animals and plants, of injurious insects and noxious weeds, the increase of production, the improvement of home environment, the extension of agricultural education and its associated juvenile activities such as boys' and girls' club work and school fairs.

To indicate the magnitude of the work undertaken and the extent of the field covered, it may be mentioned that besides hundreds of pages of editorial matter preceding part one and an immense amount of miscellaneous matter in part four, there have been published two hundred and eighty-three articles relating to the Experimental Farms System, one hundred and twenty-eight relating to the work of the Entomological branch, one hundred and twenty-five to the Live Stock branch, ninety-six to the Dairy and Cold Storage branch, ninety-one to the Health of Animals branch, eighty to the Seed branch.

sixty-nine to the Fruit branch, and seventeen to the Publications branch of the Department of Agriculture for Canada. In the provincial field the number of articles published was: Prince Edward Island, one hundred and forty-two; Nova Scotia, three hundred and twelve; New Brunswick, two hundred and thirteen; Quebec, four hundred and ninety; Ontario, seven hundred and twenty-six; Manitoba, four hundred and three; Saskatchewan, five hundred and forty-two; Alberta, two hundred

and ninety-two and British Columbia, two hundred and ninety-five.

In addition to the foregoing, The Gazette has during the last four years been the publicity medium of the International Institute of Agriculture in Canada, a bureau that has contributed material, both statistical and technical, of great value to those interested in the economic aspects of agriculture and in agricultural research.

FEDERAL AND PROVINCIAL SPHERES OF ACTION

BY HON. S. F. TOLMIE, MINISTER OF AGRICULTURE

THE activities of a government in aiding its agriculture may be investigational, as on experimental farms, educational, as carried on at the agricultural colleges, or they may take the form of extension work which deals with marketing and production. Agricultural activity having to do with marketing and production includes a great many forms of endeavour, and to be successful must be managed so that the close co-operation of the people is secured.

The Dominion and Provincial Governments of Canada have agreed upon a policy which to a very large extent will eliminate overlapping and allow for close co-operation in the various branches of live stock work.

Work touching upon production is to be carried on through provincial activities; marketing and experimental work are to be cared for by the Dominion Department of Agriculture except where special arrangements to the contrary are deemed wise. Such a programme allows for the supervision of interprovincial and international trade from Ottawa but does not interfere with intra-provincial trade. The Dominion assists marketing activities by fostering ways and means of improvement through actual participation, through grants, through experiments and through education, always bearing in mind that the great initiative must come from the people themselves.

PART I

Dominion Department of Agriculture

EXPERIMENTAL FARMS

DIVISION OF HORTICULTURE

EXPERIMENTAL HORTICULTURE IN SOUTHERN MANITOBA

BY W. T. MACOUN, DOMINION HORTICULTURIST

AN experimental station was established at Morden, in southern Manitoba in 1914, mainly for the purpose of experiments in horticulture. For many years the settlers in that district, and particularly Mr. A. P. Stevenson, had demonstrated that apples could be successfully grown, and whereas, in most parts of the Prairie Provinces apple trees were brought to fruiting age with the greatest difficulty, at Morden trees succeeded very well and bore heavy crops of fruits. It seemed, therefore, very desirable that more extensive experiments should be tried than were possible to private individuals, and an experimental station was established, and while experiments are being conducted in other branches of agriculture, horticulture has been made the specialty there.

The farm chosen was open prairie, there not being a tree on the ground to be devoted to horticultural work. The land was practically level also and the soil was a black loam.

So far ninety acres have been used for experimental work in agriculture.

In order to provide protection from wind, hedges of the Siberian Pea tree, *Caragana arborescens*, were set out ninety feet apart in 1915, and willow hedges were also planted in places. These hedges have made good growth and give excellent protection already. The following year,

1916, apple trees, plum trees, and small fruits were planted between the hedges.

Up to the present about 40 acres have been planted to apple trees as it was desired to grow all the varieties which had been found to be satisfactory in this district in large enough numbers to make the results striking. In addition, a large number of new varieties originated at the Experimental Farm, Ottawa, are being tested in small numbers as it is hoped that some of these will prove hardy enough to be grown over most of the Prairie Provinces. Some 27,000 seedling apple trees raised from seed of the hardiest varieties were planted in 1916 with the object of obtaining, if possible, something that would be more suitable than any which were available.

During the past five seasons the plantations have made very favourable growth. Apple trees are beginning to bear and plum trees have produced good crops and for several seasons the small fruits such as currants, gooseberries, and raspberries have been bearing abundantly. Strawberries currants, gooseberries, and raspberries have been bearing abundantly. Strawberries also succeed well at Morden.

Varieties of apples which succeeded well at Morden so far are mainly

Russian sorts, and are Blushed Calville, Charlamoff, Duchess, Anisette, Beautiful Arcade (Repka Kislaga), Hibernial. But there are many other varieties among those planted since 1916 which have proved hardy so far.

Plums which are doing best are Mammoth and Cheney.

Some raspberries have shown greater hardiness, two of the best in this respect being Sunbeam and Minnetonka.

The Mennonites about Morden have for many years been growing muskmelons and watermelons successfully and this year these did particularly well at the Experimental Station, Morden. Owing to the low elevation the nights are warmer than in other parts of the prairies and the tenderer vegetables succeed very well here. For this reason much attention

has been given to ripening early varieties of garden beans.

There were twenty acres of potatoes grown this year of especially good stock for seed purposes, and offers have already been made for the crop.

It is hoped to originate new varieties of fruits and vegetables at Morden which will be especially adapted to the Prairie Provinces. This year a man was employed to look up promising forms of native fruits which are to be used as a basis for this work, and many specimens were sent there during the summer and planted in nursery rows.

The work at Morden has already proved very useful and it is expected that in the future the experiments conducted at this station will be increasingly valuable to persons living in the Prairie Provinces.

DIVISION OF ANIMAL HUSBANDRY

THE FRENCH CANADIAN HORSE-BREEDING FARM

BY G. A. LANGEIER, SUPERINTENDENT EXPERIMENTAL STATION, CAP ROUGE

EXPERIMENTAL horse-breeding, feeding, housing, and management is a vast undertaking, as there are so many things to be investigated. The problems of breeding—close, in line, and out-crossing—must be studied; the questions of feeds—roughages, concentrates, pasture—should be looked into, not only for the quantities to be given to different classes of animals, idle, work, or breeding, but also for the shape in which they should be fed, raw or cooked, dry or soaked, cut or long, whole or ground; different kinds of housing should be studied, such as the stable by itself, part of the cattle barn partitioned off, cheap shelters for young horses and animals at rest; diverse systems of management should have some attention, as, for instance, work or no work for stallions and brood mares,

ways of preventing common diseases of foals, of raising young stuff, of breeding mares in the autumn.

Some of this work has already been started at many of the experimental farms all through Canada, and very useful data indeed have been collected and published. But it has always been evident that though good investigational work was done, there was not a sufficient number of animals at any one place to permit of going thoroughly into the matter. This is what led to the idea of starting somewhere a large horse-breeding farm where at least thirty brood mares could be kept and where, if necessary, as many as one hundred animals, young and old, would be available for experimental purposes.

An excellent opportunity arose for commencing this work on a

co-operative basis, whereby not only would the Dominion Department of Agriculture enlist the cordial support and assistance of the horse-breeder, but would be able to make known the results of the work in the quickest and most direct ways. To this end the French Canadian Horse Breeder's Association offered to turn over to the Department, for a period of twenty years, a farm of some five hundred acres in cultivation. This farm is located at St. Joachim, less than twenty-five miles east of Quebec city, on a good macadamized road and near a trolley station. It was inspected in 1919 by the Deputy Minister of Agriculture and the Director of Experimental Farms and pronounced very suitable for the purpose.

There are at present sixty-seven French Canadian horses, all registered, available for experimental work, as follows: 2 aged stallions, 1 two year old, 1 yearling and 5 weanling entire colts, besides 31 aged mares, 2 three-year old, 1 two-year old, 1 yearling and 7 weanling fillies. They are acknowledged by all fair-minded people to be by far the largest and best collection in existence. They were exhibited this year at Three Rivers, at the Quebec District Fair, and at the Quebec Provincial Exhibition with the result that twice as many diplomas and prizes were awarded to them as to the French Canadian horses shown by all other exhibitors combined. Amongst these prizes was the diploma, at the two Quebec Exhibitions, won by a three-year old filly

bred at the Cap Rouge Experimental Station.

It is intended, for the present at least, to conduct the St. Joachim place as a horse farm, under the direct supervision of the Superintendent of the Cap Rouge Station. Though French Canadian horses are used, it is evident that most of the problems on which it is proposed to throw some light are really of interest to all horse-breeders. But it must also be admitted that part of the work is to save from extinction what is probably the best general purpose horse in existence to-day, one which will no doubt be very useful, is hardy, easily kept, and strictly a Canadian breed. The Government of the United States is also doing work of a similar nature on its Middlebury, Vermont, Farm where it breeds Morgans.

While horse-breeding will be the main feature of the work carried on at St. Joachim, it is proposed to gather much needed data on the actual cost of producing field crops. Operations will be conducted as economically as possible, without frills of any kind, and, after a few years, it will certainly be interesting to note what a ton of hay or a bushel of oats, for instance, has cost on a place run as the average good farmer would run it. It is thus seen that the farm has two great objectives and should certainly be very useful indeed to the farmers of the Province of Quebec, and especially to those of the district where it is situated.

ADDITIONAL GRAZING LANDS ACQUIRED

BY GEO. B. ROTHWELL, B.S.A., DOMINION ANIMAL HUSBANDMAN

ONE of the main difficulties experienced by the Central Experimental Farm at Ottawa, has been due to lack of pasture and range generally. While this lack has affected the work with all classes of stock, it has made itself particularly

felt in the case of beef cattle and sheep. With the former it has been impossible to carry on other than winter experimental work, due to the very inadequate grazing facilities available in the past. With sheep the greatest difficulties have been met.

The pasture for this class of stock has consisted of a very limited rotation and of roadsides, lanes and odd corners. This "pillar to post" scheme of existence is not to the liking of sheep, the lambs suffering in particular. No increase in numbers has been possible. Only constant vigilance has kept the flocks free from internal parasitic infestation, from which they had a severe set-back several years ago.

In the spring of 1920, however, arrangements were made with the Department of Militia and Defence by which the grazing privileges of the Connaught Rifle Ranges were acquired. These ranges are situated about eight miles above Britannia on the Ottawa river and consist in all of 2,700 acres, only a part of which was utilized during the past summer. Grazing rights were formerly leased to private individuals.

This year a considerable part of this tract of land was devoted to the grazing of sheep and steers. Of the former there are 160 head consisting of Shropshire and Leicester ewes and lambs. The improvement in the

quality of the 1920 lamb crop over that of other years and due to excellent range conditions, has been all that could be desired. Seventy-five head of steers are being pastured. One-third of these will be marketed at the close of the grazing season; one-third will be finished in open front steer sheds for the Christmas trade, and the balance, recently bought will be finished for the Easter market. It is also proposed to purchase twenty-five light weight steers which will be maintained on cheap farm grown roughage in the Farm steer pens during the coming winter and finished on grass for the June market.

Briefly, the possibilities for some useful, dollars-and-cents basis, experimental work in commercial steer feeding, are unlimited, and the work already started will be expanded next year. That there is need of such evidence is admitted by all who know the uncertainty of steer feeding, which, as practised by too many feeders, is nothing short of "stock gambling." Similar lines of work are contemplated in connection with commercial lamb and sheep fattening.

DIVISION OF FIELD HUSBANDRY

THE TRACTOR IN FARM OPERATIONS

BY D. D. GRAY, FARM SUPERINTENDENT

THE call of the farmer is for efficient helpers. There has been of late years a scarcity of workmen which has hampered him on every turn. The world is asking for bread and the farmer must supply it. Intensive culture can do a great deal to meet the demand; more work and better work on every available acre, and the call for extra helpers which cannot be answered with men, must be met by machinery. The farmer of the future must be a mechanic rather than a day labourer. Greater production alone will not do it, but production must be regulated by cost, for the experience in many of

our farming operations proves that much of the profit in farming comes from the economic use of labour in cheapening the cost of production.

The power problem on the farm has in recent years created quite an interest among our farming community. While a great deal has been said and written regarding the efficiency of the gasoline tractor to speed up the many phases of farm operations, very little information has been given to the farming public regarding the cost of this useful power. On the Central Experimental Farm, we have been keeping close records of the cost of different tractors for

varied farm work, and below is a summary of some work done with the tractors we have been using during the past two seasons.

No. 1.—COST OF OPERATING

Make of Tractor	Size of Tractor		Cost per hour for fuel and oil
	On Draw Bar	On Pulley	
Gould, Shapley & Muir.....	12 h.p.	24 h.p.	77 cts.
Fordson.....	8 "	16 "	98 "
Chase.....	12 "	25 "	79 "

No. 2.—COST OF DISCING

Make of Tractor	Disc used	Size of Tractor		Cost per acre once over for fuel, oil and operator
		On Draw Bar	On Pulley	
Gould, Shapley & Muir.....	Double Cutaway 7 ¹	12 h.p.	24 h.p.	80½ cts.
Fordson.....	"	8 "	16 "	75 "
Chase.....	"	12 "	25 "	79 "

No. 3.—COST OF PLOUGHING

Tractor Used	Plough	Size of Tractor		Cost per acre for fuel, oil, and operator
		On Draw Bar	On Pulley	
Gould, Shapley & Muir.....	3 furrow	12 h.p.	24 h.p.	2.08
Fordson.....	2 "	8 "	16 "	2.65

While these figures vary somewhat it must always be remembered that oftentimes a tractor is used when its available power is not being utilized on account of the size of the implement drawn. This fact is brought out in table No. 2 where the Fordson with its greater speed had just about enough power to draw the kind of disc harrow used in securing the above data. The two larger tractors are not as highly speeded and

were not working up to their full capacity when pulling a disc harrow.

In each case, gasoline was figured at a cost of 45c. per gal., kerosene at 28½c. per gal., and cylinder oil at 85c. per gal.; manual labour was charged at 40c. per hour. It should be noted that the Fordson tractor burned gasoline, while the heavier tractors used kerosene.

THE LIVE STOCK BRANCH

WORLD'S SHORTAGE OF LIVE STOCK

P. E. LIGHT, CHIEF MARKETS INTELLIGENCE DIVISION

IT is the belief of well informed authorities on the live stock industry that consumption of meats is everywhere overtaking production. In other words, the increase in the meat eating population of the world is either moving upwards faster than is the increase in live stock population or else the latter is on the decline. In some classes of stock we have been slaughtering without due regard to the future.

Whatever may be the nature of our opinion of the live stock industry as it localized itself under the abnormal conditions of the present, following a tremendous dislocation of trade relations, involving credits and exchange, we would do well to look ahead and abroad so that our live stock, indispensable to our agriculture under all and any conditions, may be able to respond to consumptive demand when normal trade movements are again established. The fact still remains that normally the world requires 50 million pounds of beef, mutton, pork and fats annually, that the exporting countries of the world must supply approximately four billions of an export surplus to meet import need and that in Argentina, Australia, United States, Denmark and Canada, four of the chief exporting countries, marketings have, during the past year at least, been beyond the point of judicious liquidation.

A short review of the situation as it existed at the time when the normal movement of supply and demand was disrupted shows clearly that the live stock industry of the world was falling steadily behind in production in relation to consumption.

The white population of the world in 1901 was approximately 510,000,000 and in 1914 approximately,

595,000,000; an increase of about 16 per cent.

The number of feed animals at the same periods, 000's omitted, were as follows:

	1901	1914
Cattle.....	336,000	344,000
Sheep.....	588,000	600,000
Hogs.....	141,000	161,000

Reduced to "cattle units" the totals are 614,000 "cattle" in 1901, 649,000 "cattle" in 1914.

If these two quantities are divided by the white population of their respective years the results show:

- 1.2 "cattle" per capita in 1901.
- 1.1 "cattle" per capita in 1914.

This gives a decrease of .1 cattle. According to R. H. Hooker each cattle unit in the United Kingdom yields 1.171 hundredweights of meat (long) but the world's production is probably 100 lbs. The decline is, therefore, roughly 10 lbs per annum per head of world population.

In Canada, Australia and New Zealand, combined, the most important animal food stuffs producing countries within the British Empire, the percentage increase in food animals in recent years has only kept pace with the increase in population. No considerable areas of new land have been opened to the world since 1900 in such a way as to throw any large meat surpluses upon the international market. Moreover, the prairie countries (American) where heavy supplies, especially of animal products, were rapidly made accessible about the year 1880, were unfortunately stocked and cropped without regard to the future. In fact, these countries were living, as also the food importing countries that drew on them, upon accumulated capital in the way of soil

fertility during the last 20 years of the 19th century. These areas are now severely taxed to meet the increased demand, and, in western Canada, grain is still in the ascendancy, while the prairie ranches of the west have almost disappeared.

The tendency throughout the temperate countries for cultivated crops to encroach upon natural and seeded pasture is evident in Canada and the United States. From the point of view of supplies of animal food-stuffs, it makes all the difference whether the increased area taken is for crops for human consumption or cereal crops and roots, where part is used for animal consumption. The encroachment of food and industrial crops upon land formerly devoted to the rearing of animals has of late years been most noticeable in certain parts of Europe and in North America. The fact that the general ratio of food animals to human population declined in the period already mentioned indicates that food animals lost relatively rather than gained by the process. Among the different kinds of animals, pigs and poultry gain as compared with the others, whether the result of the process is to increase or diminish the total crop produce (exclusive of grass) available for food animals, because they are reared irrespective of pastures; and dairy cattle gain at the expense of beef cattle, because when pastures are reduced and crops replace grass, the former animals as a rule, become more profitable. The most marked declines is in sheep ratios in all the four regions mentioned.

Until more intensive methods of production become world wide we are faced with a world shortage of meats. Great Britain has felt the shortage least among the important

consuming countries (not considering war privations) because her well established trade connections have given her the choice of the world's exportable surplus. In other countries, however, notably the United States, Germany, Austria and France, the question has become serious, so much so that continental countries showed signs of lifting or modifying the import barriers to frozen and chilled meat before the outbreak of the European war, while the United States, partly for the same reasons, abolished the tariff, of $1\frac{1}{2}$ cents per pound, on all kinds of imported meat in 1913.

General economic progress as well as the increase in human population and the status of living in the consuming world, makes fresh demands upon available lands and tends to bring about a relative decline in the output of animals produce. This decline must be offset by an extension in live stock production sufficient to meet increased consumptive demand. Any great augmentation of population in Canada at the present time would find us in a situation where we would either be severely taxed to provide for total domestic demand, or else compelled to curtail our export trade.

In estimating the probable relation of consumption to production in the near future, three main tendencies have to be considered; first, changes in the ratios of food producing animals to population; second, of the general changes in the forms of agriculture in existence, especially as regards the ratios of resources as between pastures and crops and between the various classes of food producing animals; and third, of developments in the direction of manufacturing industries.

ENTOMOLOGICAL BRANCH

THE EUROPEAN CORN BORER INFESTATION

LEONARD S. MCLAINE, DIVISION FOREIGN PESTS SUPPRESSION

THE field scouting work for the European Corn Borer was completed for this season on October 23, 1920. The scouting started in southern Ontario early in August and was continued until the date mentioned above, as a result seven of the thirteen counties examined were found to be infested by the pest. In all one hundred and five townships were scouted, thirty-five of which were infested. In the October, 1920, issue of the *Agricultural Gazette* a brief note appeared dealing with the European Corn Borer and which stated that two distinct outbreaks had been found. An effort was made to connect these districts without success and the territory infested may be outlined as follows:

Infestation No. 1.—No material change from last report, extends along the Lake Erie shore from Fort Erie on the east to Dunnville on the west, and ten miles inland, it covers approximately, three hundred and forty square miles.

Infestation No. 2.—Area much larger than previously reported, extends along the Lake Erie shore from Bayham township on the east to Harwich township on the west, and north to Farquhar, Usborne township, Huron county. This infestation covers approximately three thousand four hundred and thirty square miles.

The unusually fine weather throughout the fall materially assisted in the carrying out of the scouting work; otherwise it would have been impossible to cover the ground. The Ontario Department of Agriculture co-operated with the Federal Department by detailing a Ford car and three scouts for this work.

In order to prevent the spread of the corn borer by the shipment of infested corn plants or portions of the plant, the following Ministerial Order, known as Quarantine No. 2 (Domestic) was passed on November 29, 1920.

Ministerial Order quarantining certain areas on account of the European Corn Borer and restricting the movement of corn and corn products in said areas.

NOTICE OF QUARANTINE No. 2
(Domestic).

Effective on and after the 29th of November, 1920.

The fact has been determined by the Minister of Agriculture and notice is hereby given that an injurious insect, the European Corn Borer (*Pyrausta nubilalis* Hubner) new and not heretofore widely prevalent or distributed within and throughout the Dominion of Canada, exists in the province of Ontario, and that there is danger of this insect being spread into other districts by reason of the movement of corn plants or portions of plants infested with the pest.

Now, therefore, I, Joseph Hiram Grisdale, the Deputy to the Minister of Agriculture for the Dominion of Canada, under authority conferred on me by Section 7 of the Destructive Insect and Pest Act, 9-10 Edward VII, Chap. 31, do hereby quarantine the following townships: Wainfleet, Humberstone and Bertie in the county of Welland; Moulton, and Sherbrooke in the county of Haldimand; Deerham, Norwich north, Norwich south, Oxford west, Oxford north and Nissouri east, in the county of Oxford; Usbourne in the county of Huron; Bayham, Malahide, Yarmouth, Dorchester south, Southwold, Dunwich and Aldborough in the county of Elgin; Dorchester north, Westminster, Deleware, Caradoc, Nissouri west, London, Biddulph, Lobo, Adelaide, Metcalfe, Ekfrid and Mosa in the county of Middlesex, Zone, Orford, Howard and Harwich in the county of Kent; all the aforementioned townships being in the province of Ontario, and by this notice of Quarantine No. 2 (Domestic) do order that no corn fodder, or corn stalks including broom corn whether used for packing or other purposes, green sweet corn, roasting ears, corn on the cob or corn cobs, shall be moved from any localities in the said quarantined townships to points outside those townships.

This quarantine shall not apply under the following conditions:—

I. To the articles enumerated, when they shall have been manufactured or processed in such a manner as to eliminate the risk of carriage of the European Corn Borer.

II. To clean shelled corn and clean seed of broom corn.

III. To shipments of the articles enumerated, transported through the quarantined areas on a through bill of lading.

IV. To shipments of the articles enumerated, for experimental or scientific purposes, by the Dominion Department of Agriculture or the Ontario Department of Agriculture.

V. To shipments of dried seed corn on the cob for exhibition purposes and consigned

to the secretary of a winter fair or exhibition duly recognized by the Dominion Department of Agriculture or the Ontario Department of Agriculture. Such shipments shall be inspected at the point of destination by an inspector duly appointed under the Destructive Insect and Pest Act.

Any person who contravenes this quarantine will be prosecuted as provided for in the Destructive Insect and Pest Act.

This order shall take effect immediately and be in force until further notice.

Witness my hand this date and the seal of the Department of Agriculture, Canada.

(Sgd.) J. H. GRISDALE,

(Seal) Deputy Minister of Agriculture.

November 29, 1920.

FRUIT BRANCH

TELEGRAPHIC MARKET NEWS SERVICE

BY C. W. BAXTER, FRUIT COMMISSIONER

DURING the heavy movement of fruit, Telegraphic Market News Letters are published simultaneously at Middleton, N.S., Ottawa, Ont., Winnipeg, Man., and Vancouver, B.C. During the remainder of the marketing season they are published at Ottawa only. These reports contain wholesale prices of fruits, potatoes and onions, at marketing centers and f.o.b. prices at the principal loading points throughout Canada.

Through the courtesy of the Department of Trade and Commerce, the Canadian Fruit Trade Commissioner in the United Kingdom, who during the fruit exporting season devotes practically all his time to promoting the interests of Canadian fruit shippers, cables direct to the Fruit Branch apple prices from day to day at the principal primary

distributing points. These are also included in the Market News Letters, which will be mailed free to any person upon application to the Fruit Branch, Department of Agriculture, Ottawa.

During the present season the Fruit Trade Commissioner in the United Kingdom will forward to the Department of Trade and Commerce semi-monthly reports covering in detail the condition on arrival of specific apple shipments, additional details as to values, fluctuation of the markets, trade preferences, the condition under which sales are made, recommendations for meeting market requirements and other matters of interest to fruit exporters. Any one interested in receiving these reports may receive them by making application to the Commercial Intelligence Branch of the Department of Trade and Commerce, Ottawa.

INTERNATIONAL INSTITUTE BRANCH

DEPOSITORY FOR OFFICIAL PUBLICATIONS

BY MISS A. L. SHAW, B.A., LIBRARIAN

WHILE the main duties of the Branch of the International Institute of Agriculture are to furnish the headquarters of the Institute at Rome with information on Canadian agriculture, and to collect and distribute in Canada foreign agricultural information, as is done in Part V of The Agricultural Gazette, it contributes a third service through its library of agricultural literature.

This library, which is now the Department's authorized depository for official publications, was commenced in the year 1910 with such pamphlets and other literature as were collected in Canada and sent to Rome, as well as such publications as reached the Branch through the agency of the International Institute. The library has steadily developed until it contains upwards of 8,500 bound volumes, many pamphlets, and much unbound material, all of which are classified by the Dewey Decimal System. In addition to the actual contents of the library, very extensive bibliographical references are available inasmuch as it contains in alphabetical order the cards referring to agricultural literature issued by the United States Library of Congress. Further, the library possesses

the International Catalogue of Scientific Literature, and a number of periodicals which give notice of new publications. The card catalogue itself comprises over 200,000 cards.

The library is first available to officials of the Department of Agriculture, but all students of agriculture who wish to do so may make free use of its services. In addition to the library, which occupies spacious quarters in what is known as the West Block, these are two stack rooms and a reading room containing about six hundred periodicals. The reading room is of recent development and is proving of much service to government officials and others who wish to make exhaustive study of any agricultural subject.

An extension service is of even more recent development and affords the services of a circulating library, which has been made available to all recognized government officials. From time to time descriptive lists of accessions are sent to interested persons in Ottawa, and more recently this service has been extended to all the members of the newly organized Canadian Society of Technical Agriculturists. The books are sent out free on request and without the necessity of paying postage either way, to be returned within a limited period.

THE DAIRY AND COLD STORAGE BRANCH

THE GRADING OF DAIRY PRODUCE

BY J. A. RUDDICK, DAIRY AND COLD STORAGE COMMISSIONER

SOME measure of control is now exercised over the exports of dairy produce from nearly all the leading exporting countries. This has been found necessary to meet competition which grows keener every year.

In New Zealand all butter and cheese must be graded before it is exported. The grader's certificate is recognized as a commercial document in much the same manner as the certificate issued by the Board of Grain Commissioners in Canada is recognized. Butter and cheese exported from Australia is also graded to some extent. No butter may be exported from Denmark unless it bears the well known national or "Lur" brand, and before any creamery is allowed to use this brand the authorities must be satisfied that it is producing a pure article, which measures up to a reasonable standard of quality. A similar provision is in force in Sweden, and butter exported from that country bears what is known as the national or "Rune" brand. In Holland the government control consists of issuing of export marks for butter and cheese, which guarantee the purity of the article and the general standard of good quality.

A first step towards the grading of dairy produce for export is the establishment and recognition of uniform standards of quality and definitions for the different grades. A forward step in this direction was taken at the Dominion Dairy Conference held in Ottawa November 25-28, 1918, under the auspices of this Branch. The conference adopted what is now known as the Canadian National standards for butter and cheese, including a scale of points for scoring and definitions for the different grades.

These standards have since been adopted and followed in the provinces where some grading of butter and cheese is being done for domestic trade. Alberta, Saskatchewan, Manitoba, and Ontario have established depots for the optional grading of butter samples sent in from the creameries. The cheese sold in New Brunswick has been graded during the past two years. The Farmers' Central Cooperative of Quebec, selling butter and cheese by auction at Montreal, have it all graded before it is offered for sale. Cheese sold by auction at Montreal by the United Dairymen Co-operative of Ontario is graded by a Dominion official.

The matter of grading of dairy produce was discussed at a conference of provincial Deputy Ministers of Agriculture held at Ottawa, March 17-19, 1920, and the conclusion was reached that the grading of dairy produce for export was a Dominion function, but grading for domestic sale might be carried on under provincial authority. A resolution asking the government to establish a general system of grading dairy produce for export was moved in the House of Commons during the last session, and received the unanimous support of the members. The Minister of Agriculture announced that when producers and others interested were ready for the grading of export dairy produce the Dominion Department of Agriculture, through the Dairy Branch, was ready to undertake the work.

During the past two seasons the Dairy Division has conducted a Dominion Educational Butter Scoring Contest, which provided for the collection of samples of butter from a number of creameries in all the provinces monthly during the summer

season. The samples have been scored by competent judges and full reports issued to all the creameries. Selected samples have been taken to the different provincial dairy conventions, and butter makers, dairy officials and produce graders have had an opportunity of examining and discussing them. By authority of the Minister the expenses were paid for one delegate from each province to attend a conference on grading at Montreal at the close of the 1919 contest. Other officials and representatives of the produce merchants were invited to attend. Another similar conference was held on the 3rd and 4th of November. The samples in the 1920 contest and other commercial samples supplied by produce merchants were gone over and discussed, all with a view of securing uniformity in the scoring and grading of dairy produce. It is only by such conferences that uniformity can be secured, as the grading of dairy produce is to a large extent a matter of judgment. A committee of the conference addressed the following letter to the writer at the conclusion of the conference:

"For some years past it has been realized by those in close touch with the manufacturing and marketing of dairy products in Canada that the annually increasing production of creamery butter would eventually necessitate the securing of a profitable export outlet for the surplus. It is generally conceded that any such export trade in Canadian creamery butter must be based upon uniform and well defined standards of quality. You deemed it advisable to call a Dominion-wide dairy conference at Ottawa in the fall of 1918 for the purpose of considering among other important matters relative to the dairy industry the question of establishing uniform grade standards for dairy products, including creamery butter. The standards recommended were afterwards adopted by the several provinces. The general feeling of the delegates to the Dairy Conference appeared to be that, owing to the varying local climatic and marketing conditions, it would likely be years before such standardization could be accomplished. The vigorous policy adopted by your department in carrying out the "Dominion

Educational Butter Scoring Contest" of 1919, followed by a similar contest in 1920, in addition to the valuable work carried on in the different provinces by the members of your staff, especially by Mr. Geo. H. Barr, Chief of the Dairy Division, has demonstrated that in the short space of two years a Dominion wide standard has proven to be practicable and generally accepted by the produce trade. The general uniformity and type of the butter entered in the contest by the creameries of the different provinces, especially in 1920, demonstrated beyond a doubt that it is practicable to manufacture butter of a similar type and quality in each of the provinces, irrespective of local conditions.

Therefore be it resolved that we, the dairy representatives of the several provinces of the Dominion, including the Provincial Dairy Produce Graders, in conference assembled, do hereby express our sincere appreciation of having been given the opportunity of meeting together during the past two days for the purpose of conferring with yourself and staff; to examine the different samples of butter; to interchange our views in connection with the many problems of manufacturing and grading; and to meet a number of the prominent members of the wholesale produce trade.

Realizing as we do the importance of the close co-operation of the produce trade in bringing about a general marked improvement in the quality of creamery butter and in the maintenance of grade standards, we wish further to express our appreciation of the assistance already given by the members of the produce trade in this connection.

We also desire to place on record our sincere thanks for the excellent work done by the judges in the Dominion Educational Butter Scoring Contest and to place on record our appreciation of the great educational value to the Dairy Industry of Canada of contests of this nature."

There is at the present time a growing feeling that if Canada is to hold her own in competition with the world in dairy produce some steps should be taken in the near future to provide for the grading of all dairy produce intended for export. It will be seen by the foregoing statement that the ground is being prepared for the successful operation of a grading scheme whenever it is considered desirable that it should be put in force.

PART II

Provincial Government Departments

AGRICULTURAL INSTRUCTION ACTIVITIES

PRINCE EDWARD ISLAND

THE work carried on in the province of Prince Edward Island under the Agricultural Instruction Act is varied in character. During the quarter ending with September, the work accomplished included demonstrations and instruction in relation to soils and crops, live stock and dairying, co-operative marketing, Women's Institutes, and school fairs.

Drainage, Soils and Crops.—The interest manifested throughout the province in growing clover for seed has justified the purchase of two clover hullers by the department and their operation for the benefit of the growers.

Ditching machine demonstrations continued throughout the season with the exception of a stop of one and a half months due to a shortage of drainage tile. The company operating the local brick and tile plant has since ceased work and it may be found necessary for the department to take some action by way of encouraging the re-establishment of this industry if underdrainage work is to continue.

The limestone pulveriser purchased this year is operating in the western part of the province, and is giving satisfactory results in the crushing of limestone. The product is being distributed principally among the farmers of the immediate vicinity.

Live Stock and Dairying.—The competition among dairymen to induce more interest in the improvement of herds has progressed favourably, and will be reported in complete form with the next quarterly report.

The Dairy Instructor, Mr. Morrow, has given full attention to the work of the cheese and butter factories throughout the season, and has also given a part of his time to the promotion of the dairy competition and the Charlottetown Cheese and Butter exhibit.

Co-operative Marketing.—A co-operative organization of potato growers has been established for the purpose of supplying disease free seed. During September arrangements were made to ship several carloads of seed potatoes to United States points.

During the early part of July much of the wool collected and sold for the Sheep Breeders' Association was distributed to the various purchasing companies.

Women's Institutes.—The full time of the staff of this branch has been taken up with meetings of Institutes, demonstrations and judging at provincial exhibitions and school fairs.

Elementary Agricultural Education.—Forty-four School Fairs were conducted during the month of September, and in every case gave evidence of an increased interest in the work. The formation of Boys' and Girls' Clubs in a majority of the School Fair centres is also adding much to the interest in agricultural work, particularly in poultry keeping.

A Technical and Agricultural School has been established for the education of such boys as desire further elementary education beyond the limits of the public school course. A competent principal has been placed in charge, and arrangements are being made to open the course at an early date.

ONTARIO

THE following is an account of some of the activities carried on by the province of Ontario by virtue of the federal grant for the six months ending September 30, 1920:—

Ontario Agricultural College.—During the past two or three years moneys were accumulated under the federal grant for the erection of a men's residence at the Ontario Agricultural College. Work was deferred until the conclusion of the war, but during the present year good progress has been made and the building is now nearing completion. It is a splendid stone building and will be a very creditable addition to the college equipment. It will accommodate about 150 boys and is very greatly needed as the present accommodation is less than 300 and the attendance in the regular courses is over 500.

In connection with the additions to the staff of the college made possible by the federal grant it may be of interest to note that Mr. A. Leitch was added to the staff several years ago under this grant and given charge of Farm Management at the college. It was out of this work and out of this appointment that the Farm Survey work was later developed. A Farm Economics department has now been formally added to the departments of the college and is being financed entirely out of provincial funds.

One of the new appointments to the college staff made possible by the federal grant is that of a Lecturer in Dairying, to which Mr. W. H. Sproule was appointed a few months ago.

Kemptville Agricultural School.—The Kemptville Agricultural School owes its existence entirely to the Federal grant. During the past few months two important buildings have been completed, namely, the administration building and the engineering building. These buildings,

together with the judging pavilion erected a few years ago and the regular farm buildings, constitute the equipment of the school. The engineering building is a plain, one storey brick structure costing about \$14,000 and erected entirely during the past few months. It is being equipped for a very thorough and practical course in farm mechanics. The first regular course opened on October 25.

Agricultural Representatives.—Slightly less than one-half of the agricultural representative work is now financed out of the federal grant. There are now 48 local offices and each of these offices is at the service of the farmers of the community in various ways from day to day. Features of the work are announced from time to time. During the past summer the outstanding feature of the work has been the holding of the rural school fairs. The school fair was adopted a number of years ago as a means of interesting the boys and girls of the farm in agricultural matters, and it has proved a most effective agency in this behalf. There were 401 school fairs held during the past season. The distribution of seeds and eggs, organization of the fairs and the securing of judges and assistants—all these things are looked after by the agricultural representative service and consequently constitute a very considerable part of the work of the men in the field during the spring and early fall months. The final figures of entries and attendance are not yet available but it is certain that the school fair has held its place in the confidence of the grown up people as well as in the enthusiasm of the youngsters.

Co-operation and Markets Branch.—There continues to be a very considerable demand for information and assistance in the organization of co-operative companies for the more effective marketing of farm produce. During the past few months the

Director of this Branch has supervised the applications for incorporation of a very considerable number of farmers' companies in all parts of the province. He has also had charge of the work following the legislation adopted at the last session for government assistance to seed cleaning centres. Many enquiries have been received on this subject and no doubt the preliminary efforts which have been made will result in organizations being effected during the next few months. Farmers' Clubs have in considerable numbers asked for assistance in their methods of book-keeping and in club organization and management in general, and these have also been looked after by this Branch. With the resignation of E. G. Gordon to accept a position with the Live Stock Branch of the Federal Department, the special work in regard to live stock shipping has been discontinued as this is now being very well looked after by the United Farmers' organization.

Vegetable Work. The whole time of the Vegetable Specialist and the part time of two summer assistants is devoted to the work of assisting the commercial vegetable growers in different sections of the province and this is entirely made possible by the federal grant. During the past season two definite lines of work were carried out. One was with regard to the control of insects and diseases generally. In combatting the cabbage-root maggot, for instance, over 100 acres of cabbage were supervised in all sections of the province, each plot ranging from one-half to two acres. The treatment consisted of corrosive sublimate, one ounce to ten gallons of water, put on five days after planting and then once a week for three weeks. The results have been most satisfactory and practically every man who has been brought in touch with the work has been convinced of its effectiveness in controlling this maggot. The other distinctive line of work is with

reference to fertilizers and 175 demonstration plots were handled in various parts of the province. These were of course handled co-operatively with the growers. They include various combinations of fertilizers on various soils and crops, but the results have not yet been tabulated. In addition to specific lines, instruction on all branches of vegetable growing has been given. Fifteen Field Days were held in August and the attendance at each of these ranged from 25 to 60, with an average possibly around 35. These Field Days consisted of meetings on the grounds of a grower and all the growers in the district were invited to come and bring their problems for discussion and possible solution.

O.A.C. Short Courses.—Last winter the winners of the Acre Profit and Live Stock Competitions had paid their travelling expenses and living expenses to Guelph for a two weeks Short Course, and were thereby enabled to participate in the different Courses in the following numbers.—Stock and Seed Judging, 24; Dairying, 2; Vegetable Growing, 1; Poultry, 1; Farm Power, 1. In addition the winners in Eastern Ontario went to the Short Course at Kemptville, 8 taking the Herdsmen's Course and 6 the Farm Power Course. Similar competitions have been conducted during the past growing season and the results are now being tabulated.

Experimental Work at Vineland. P. E. Culverhouse has for some years been engaged in connection with the Vineland Experimental Farm in carrying on experiments in the most profitable use of fruit by-products. Considerable work was done in testing the proper season for picking grapes and also testing the best varieties of vegetables and fruits for canning. Mr. Culverhouse resigned at the end of August to go into commercial work and no appointment has since been made.

Demonstration Work on Soils. Considerable progress has been made in connection with the soil work and results will soon be ready for publication. During the past few months samples of soil collected last fall in Essex and Kent have been analyzed and tabulated. Tests are also being made as to the best methods of handling various soils. In Norfolk county near Simcoe a plot of six acres has been leased in order to ascertain the best methods of building up light blow sand, while in Welland 15 acres have been taken over with a view to demonstrating the handling of heavy clay lands. In Essex and Kent co-operative experiments have been carried on with

the farmers in tobacco, corn and sugar beet crops.

Corn work. In the spring, plans were drawn up for carrying out co-operative work in testing varieties of corn in different parts of the province. The local supervision was left in the hands of the agricultural representatives and the general plan was drawn up and seed distributed by the Corn Specialist. At the end of June the Corn Specialist resigned to go into commercial work and no further appointment has since been made. The work under the agricultural representatives was followed up, however, and the results are now being tabulated.

PRINCE EDWARD ISLAND

AGRICULTURAL LEGISLATION

BY W. BOULTER

THE agricultural legislation passed during the 1920 session of the Legislature of Prince Edward Island, included an amendment to the Act for the encouragement of agriculture; an amendment to the Act respecting domestic animals and an Act to incorporate the Prince Edward Island Veterinary Medical Association. The amendment to the Act for the encouragement of agriculture increases the annual grant paid to Farmers' Institutes from the fixed grant of \$15 to a minimum grant of \$20 with a sliding scale of \$5 for every fifteen members above the number of thirty, up to one hundred and eight members which would give the maximum yearly grant of \$45. The special grant for the purchase of pure bred live stock was increased to a maximum of \$50 per year providing a like amount is raised by the institute in addition to their membership fees, with the further provision that at least seventy-five per cent of the additional grant and

moneys subscribed be appropriated within the current year in the purchase of pure bred stock for the use of the members of that institute. In all cases the animals selected must be pure bred, or shall be proven sires or shall be of superior individual merit, passed and recommended by an official of the Department of Agriculture.

The amendment to the Domestic Animals Act provides that a fine of twenty-five dollars may be imposed on the owner of a stallion or bull, and ten dollars on the owner of a ram or boar pig who allows the same to run at large or who does not take proper means to keep them in control or confinement.

The Act to incorporate the Prince Edward Island Veterinary Medical Association provides for the registration of persons practising veterinary medicine as defined in the Act. Members are admitted on producing a diploma which would qualify for

membership in the American Veterinary Medical Association or would admit to the examination for veterinary inspectors prescribed by the Dominion Department of Agriculture. Persons who have practised the veterinary art in the province for the

past five years are admitted to membership in the association. Penalties are provided for the practising of veterinary medicine in the province without proper qualifications.

THE GRADING OF PURE BRED RAMS

THE Department of Agriculture of Prince Edward Island has adopted the bonusing of pure bred rams. The plan followed is similar to the one adopted last year by the New Brunswick Department. The pure bred flocks of the province for which applications were made, have been graded by an officer of the federal Live Stock Branch. The rams have been classified into three

classes designated as xxx, xx, and inferior rams. The inspection which was not commenced until October after some of the rams had been sold discovered eighteen xxx rams and sixteen of the second grade or xx rams. The Department pays the breeder a bonus of \$3 per head of xxx rams and \$2 for each xx ram in the flock. No bonus is paid for inferior rams.

NOVA SCOTIA

THE BONUSING OF SUPERIOR RAMS

THE Nova Scotia Department of Agriculture, with a view to improving the sheep stock of the province by the use of better rams, have adopted a policy of paying a bonus to breeders of pure bred rams that reach a certain standard of quality. To this end the pure bred flocks of the province have had their rams classified by an official of the Live Stock Branch of the Department of Agriculture at Ottawa. The classification by this

official shows that eighty-two rams are of superior quality and are graded xxx, fifty-five are of second quality and are graded xx. Rams going below xx are not eligible for bonus. The bonus contributed by the department to the breeder is \$3 for each xxx ram and \$2 for each xx ram in the flock. The department at Truro has a list of xxx and xx rams that will be supplied to prospective purchasers.

THE WORK OF A COMMUNITY CLUB

BY MISS IRMA B. CAMPBELL, RURAL SCIENCE TEACHER

SOME time ago it was my pleasure to report the organization of the South Berwick Community Club. I shall now give a brief account of the progress and development of the club.

In the fall of 1919, after a summer interval, during which the club met

only for sports and social purposes, it was re-organized, and a most interesting programme was carried out during the winter. Community singing held an important place in this programme. Song books were purchased, and the meetings were usually opened with one or two

old-time songs, or a popular number. Another interesting feature of many meetings was a fifteen or twenty-minute discussion on some question presented by a member, the discussion being opened by the member who put the question. The following are representative examples of the questions discussed:—"Is enough attention given to music in our public schools?"—"Does our system of education tend to draw children away from the farm?"—"What does it mean for parents to be good to their children?"—"Resolved that under present conditions farming is one of the least attractive occupations open in this Province. How can it be made more attractive?" At various times the club was addressed on such subjects as Community Life, The Farmer's Movement, and matters of more local interest.

In the month of February the social committee sent out invitations to all residents who were non-members of the club, to be the guests of the club on a certain date. A special programme was rendered, refreshments were served, and the president after explaining the "platform" of the club, invited the guests to join. Thirteen new members were added as a result.

Through the courtesy of the Dominion Atlantic Railway, which furnished all equipment and a lecturer,

motion pictures were shown on various interesting subjects, such as Bee Culture, Apple Packing, Reforesting, Raspberry Culture, Community Canning.

The educational and parent-teacher committees have taken a deep interest in the welfare of the school, and this interest has been communicated to the club itself. Prizes were donated for deportment, and in many ways the club has made its influence felt in the school—always for good.

Through the efforts of the beautifying and landscape committee, unsightly buildings have been moved and repaired, the school grounds improved—club and school uniting on Arbor Day for this purpose.

Sports have not been neglected, and seldom in a rural community do we find young people enjoying themselves together in as wholesome, whole-hearted away as do the S.B.C.C. members. There is no doubt in the heart of any member, whether old or young, as to whether the club is worth while. It is a community institution which will live.

The programme for the coming winter has not yet been decided upon, but it will doubtless follow to a certain extent the previous ones, with such changes and innovations as develop or are deemed advisable.

Have a Community Club!

FIRST EGG-LAYING CONTEST CONCLUDED

THE first egg-laying contest carried on by the Nova Scotia Department of Agriculture was concluded at the end of October. The contest included thirty entries of five birds each.

The total number of eggs laid by the one hundred and fifty hens was 22,881, an average of 152.54 each for the eleven months. Ten prizes were

awarded for pens and ten for individual hens.

In the pens, the Rhode Island Reds won the 1st, 2nd, 9th, and 10th awards; the Barred Plymouth Rocks won the 3rd, 4th, and 8th awards; White Leghorns won the 5th and 6th awards; and the Anconas won the 7th award.

In the prize winning pens the highest number of eggs laid was 994, and the lowest was 809. In the prize winning hens the highest number of eggs laid in eleven months was 254 and the lowest 197. In the full year the highest scoring hen laid 277 eggs.

A number of pens in the contest laid more eggs than some of the prize winners, but they failed to qualify for a prize, because their eggs fell below the Canadian egg standard of two ounces per egg. The second contest began on the first of November and will continue for an eleven month period.

The hens were kept in double colony houses. The feeding was in no way unusual. The morning meal was grain scattered in litter. In cold weather this was wheat and corn in equal parts, but at other seasons wheat was fed alone. In fall and winter dry mash was given in hoppers. This consisted of bran, middlings, corn meal, ground oats and meat scrap in equal parts by weight. At noon each day a moist feed, that was consumed in ten minutes, was given. This consisted of boiled vegetables mixed with bran and middlings. Water was constantly available as were also grit and oyster shells.

NEW BRUNSWICK

FIELD CROP COMPETITIONS

BY O. C. HICKS, B.S.A., SUPERINTENDENT, SOIL AND CROP DIVISION

FIELD Crop Competitions, conducted by the Agricultural Societies Branch of the Department of Agriculture under the amended rules of the Dominion Seed Branch, 1920, were carried on in thirteen counties. The same counties participated this season as did last year.

The combined seed crop and cleaned seed competitions were instituted in four counties, while the usual form of competitions were held in the other nine.

A province-wide contest for a five-acre field of red clover to be judged as a combined seed crop and cleaned seed crop did not materialize on account of an insufficient number of entries.

In four of the eastern counties, viz., Restigouche, Gloucester, Northumberland and Westmorland, the product of which section was previously reported as being of superior quality by the Dominion Potato Inspection

Service, the potato crop was preferred and by Westmorland county oats too was preferred for the combined seed crop and cleaned seed form of competition.

By permission the basis of awards on the potato crop in these counties was altered to allow sixty-five per cent to apply in the field inspection and thirty-five per cent to the inspection in the bin.

The estimated quantity of potatoes that will be graded in these competitions to conform to the grade Canada A for inspection is ten thousand bushels. The producers of much of this stock are members of organized potato seed centres and from among these co-operative shipments of seed will be made.

The quantity of surplus graded seed oats available as a result of the competition in Westmorland county is estimated at three thousand bushels and an effort will be made to have these inspected in car-lot quantities at one or more points.

QUEBEC

AGRICULTURAL REPRESENTATIVE ACTIVITIES

COUNTY OF LAC ST-JEAN

BY A. J. M. BELANGER, B.S.A.

MY four years work in the Lac St. Jean district as Agricultural Representative has been directed towards an improvement in the system of grain growing and in the raising of live stock. We have succeeded in getting a seed centre warehouse established, which we hope will insure the sowing of carefully selected seed grain grown in the locality. By experiments our farmers have been convinced of the necessity of treating seed grain for such diseases as smut. The three main points I endeavour to impress on the minds of the people are the necessity of a careful selection of seed, the treatment of seed for diseases and the sowing of acclimatized grain.

With a view to improving the sheep stock of the county, advantage has been taken of the staff of the Live

Stock Branch of the federal department of agriculture to assist in securing pure bred rams. There have been brought into the county during the past two years fifty-two rams and ten ewes of the Oxford breed and seventy-five rams and twenty-five ewes of the Shropshire.

The horse stock of the district has been of too light a character to handle the farm work expeditiously. To improve the stock there have been brought into the district since last July twenty Percheron mares and six Percheron stallions. These animals have an average weight of about fourteen hundred pounds.

It is our constant aim to convince the farmers of the necessity of taking great care of their young animals in order that they may be kept thriving during their growing period and afterwards maintained in good condition.

COUNTY OF TEMISCOUATA

BY ROGER GAGNON, B.S.A., AGRICULTURAL REPRESENTATIVE

AMONG the various activities that are being carried on in the interest of the agricultural class of the county of Temiscouata, there are two to which we desire to call the attention of the readers of *The Agricultural Gazette*.

1. The introduction of pure bred males at the head of the herds and flocks of the various kinds of animals.

2. Educational and organizing work, especially in newly settled parishes.

An endeavour was made, especially during last year, to help the Live Stock Branch of the Dominion Government in its efforts to introduce pure-bred males in this district.

Some thirty breeders' associations were formed in this district by myself and assistants, under the terms laid down by the Dominion Live Stock Branch. Males of the cattle, hog, and sheep species were borrowed by these associations.

As land settlement is one of the most important questions of the day, the settler has received a good part of our attention, as it was desired to help the good work of the Department of Colonization and improve the conditions for these courageous pioneers. For this purpose a week of short courses was organized in a new parish St. Michael du Squatteck, where a series of lectures was given

on agriculture, stock raising, horticulture, fruit growing, bee keeping, and poultry raising. Our teachings were made as practical as possible and accompanied by demonstrations. A farmers' club was organized, to which all the farmers belong. Fifty-one visits were made and information was given on the spot. A breeding association was organized in order to introduce four Canadian bulls, four Leicester rams, and two Chester White boars. A quantity of bulletins on farm topics were distributed, as well as a number of samples of ten pounds each of seed grain, of varieties suitable for the district. Fifty apple

trees were planted in a demonstration orchard.

The farmers of this district sowed nothing but improved grain seed last year which was all purchased from the Seed Growers' Co-operative Association of Ste. Rosalie Junction.

A school fair held this year was a success in the number and quantity of exhibits and the interest displayed.

We hope that with the good spirit now existing among the farmers, agriculture will rapidly go ahead. This progressive spirit will be kept up from time to time by lectures and practical demonstrations.

COUNTY OF PORTNEUF

BY J. C. MAGNAN, B.S.A., AGRICULTURAL REPRESENTATIVE

IN their educational work, agricultural representatives have their own systems and their own methods. In the county of Portneuf, where I have been stationed as representative for the last seven years, I considered that my first duty was to come into contact with the farmer, to study conditions on the spot, and lastly, to make known to all the object of my work and the means at my disposal to serve the interests of the agricultural community. I also had to convince the civil and religious authorities in every parish and the leaders in agriculture, of the usefulness of my work and of the services that I could render.

The work that has been the most beneficial is the technical and educational campaign which has been conducted by means of three agencies, viz.: the primary school, meetings of farmers at home, and visits to the farms.

THE PRIMARY SCHOOL

The primary school is one of the best factors that we have to spread our ideas and to train our future citizens. Through school gardens,

school fairs organized by the pupils, through the young gardeners' clubs, through the courses of agriculture given in academies, we have helped in preparing the future agriculturists of the district who have since become our best farmers, all progressive men, taking an interest in the work and desiring to know everything about their profession. No farmers have shown more public spirit or have taken more interest in co-operation than those who have received our teaching, at the school or on the farm. They are our best friends. It should not be forgotten that it is very difficult to make any permanent progress among the old generation. A generation cannot be rebuilt; it is more practical, I think, to use the means that we have to train the rural youth. The school has also enabled me, more than anything else, to come into contact with the local authorities, school boards, parents, and farmers. This contact has greatly facilitated our work.

PRIVATE MEETINGS OF FARMERS

I have been organizing farmers' meetings in villages and in ranges

for the last seven years. A good farmer will invite at my request some thirty or forty farmers in the neighbourhood and the evening is spent at this farmer's home in instructive talks, and even in amusements; smoking is not prohibited, and the evening ends in songs and music. About one hundred meetings of this kind have been held since I was representative in this district. They have been a wonderful help to me, to enable me to know the farmer, his ideas, his ideals; and the farmers also have learned to know me, to understand me and to follow my work. It is from such meetings also that have originated all good

movements, experiments, new methods of culture, competitions, etc.

VISITS ON THE FARM

Since 1913 I have visited some 3,200 farms. We have done our best to develop this service by studying on the spot the problems of each farmer and by endeavouring to solve them in the best possible way. Through such visits we have been able to gather information, to find out all about local agricultural conditions and to benefit by individual experience. Practical demonstrations have also greatly helped in the improvement of agricultural work.

COUNTY OF MONTCALM

BY L. J. SYLVESTRE, B.S.A., AGRICULTURAL REPRESENTATIVE

I HAVE been in this district only since last April, and my work so far has been limited to studying the commercial and economic situation and observing the various systems of farming. In addition to this work, I was called at once to give lectures and demonstrations on the treatment of seed grain. Plant diseases spread with such rapidity, threatening our crops and causing widespread damage, that means had to be taken to check their ravages.

The management of farmers' clubs and of other associations for the advancement of agriculture has also taken some of my time; several of our agricultural associations have become inactive and no longer fulfil the purpose for which they were organized. I have endeavoured to stir up these organizations, to check their backward tendencies, to instil

new life into them so that they may reach their object, and so that their members may thus participate in the benefits which are to be expected from their work.

I have also given a great deal of attention to clover growing as a means to improve our lands, which are rapidly losing their fertility. To hasten this good work, I have advised the farmers to get together for the purchase of clover hullers and thus do their own harvesting of clover seed. I am anticipating a successful season, as it is now certain that several thousand bushels of this valuable seed will be threshed this year in our district.

To sum up, I am glad to be able to say that our work and our endeavours have not been fruitless, and that great improvements may be looked for in the near future.

COUNTY OF DORCHESTER

BY P. A. BRUNEL, B.S.A., AGRICULTURAL REPRESENTATIVE

ON account of the present high price of clover seed and of the necessity of sowing clover freely on at least a part of the rotation, a campaign was started in favour of growing clover for seed. Meetings were held in each parish during the winter and lectures were given in which an endeavour was made to bring out the advantages of clover growing as regards the improvement of the soil, the production of splendid fodder for the cattle, and of seed of good quality for sowing.

Farmers were advised to co-operate in the purchase of clover hullers to thresh the seed. Ten associations have been already established and have purchased these machines at a moderate cost to their members.

Over 4,000 pounds of clover seed were threshed last spring and a very large increase is expected in a few years. It is very gratifying to see that clover growing was taken up with so much enthusiasm, for there is no doubt that every farm which has harvested clover seed will greatly benefit thereby.

TERREBONNE AND LAVAL COUNTIES

BY ARTHUR LANDRY, B.S.A., AGRICULTURAL REPRESENTATIVE

THE activities which engaged the major portion of the time of the Agricultural Representative throughout the past season were the holding of school fairs, the giving of public demonstrations of tractors of various makes, and the carrying out of demonstrations in the dipping of sheep. Six school fairs were held in Terrebonne and Laval counties. In conjunction with these, five Canadian bankers' competitions were held. The Department of Agriculture held competitions of tractors in each of the

counties of Laval and Terrebonne. To assist farmers who wished to purchase tractors the department arranged with the manufacturer to provide these at wholesale prices.

Terrebonne county is recognized as very suitable for sheep raising. In the northern part of the county some 3,500 head are kept. To assist in the better care of the sheep and to give stimulus to the co-operative sale of wool and sheep, a dipping demonstration was given at which 1,500 sheep were treated.

CROP COMPETITIONS

BY ARMAND LETOURNEAU, B.S.A., JOURNAL OF AGRICULTURE

IN order to encourage the farmers of the province to produce good and pure seed, suitable for the special conditions that are found in each locality, a special grant of \$275 was offered this year jointly by the Quebec Department of Agriculture and the Dominion Department of Agriculture, to agricultural associations

desiring to replace the original "Standing crops competition" by two other contests, named "Seed competitions." This grant of \$275 was divided as follows: \$200 for a seed competition for wheat, oats, barley, peas, buckwheat, timothy and potatoes; \$75 for a clover seed competition.

SEED COMPETITION

This competition differs from standing crops competitions held in the past by the fact that it begins during the summer and closes only in winter, when seed grain has been threshed and selected. One of the following crops may be selected by the agricultural association entering: Wheat, oats, barley, peas, buckwheat, timothy and potatoes, but not more than one. In addition, the agricultural association that has already organized such a competition may also open a special competition for clover and get an additional grant of \$75.

The crops while standing were inspected by judges who scored them by means of an official scale of points, to establish the standing of each competitor. A second inspection of threshed and prepared seed will be made by the judges in the granary of the competitor and marks will be granted for quantity, quality and preparation of threshed grain. The minimum number of entries required to hold a competition is twenty-five. The competitor having the largest number of marks receives as prize a Clipper fanning mill No. 1B with fifteen screens.

The second inspection, that is the inspection of threshed seed grain, will begin on January 15, 1921. The competitors must prepare for that date and store the seed in a special place. No member whose crop has not been inspected during the summer can be admitted to the second selection, and a member who has not the quantity of seed required is disqualified. In inspecting threshed grain, the judges will grant marks for the building in which the grain is kept and for the machinery with which it was cleaned and prepared. It is hoped that through this work, organized by the Department of Agriculture, the best known varieties of each crop will be generally grown throughout the province.

The grant for these seed competitions was \$150 for twenty-five competitors and \$200 for forty competitors. There was also a grant of \$75 for the clover seed competition, for a minimum of fifteen entries.

Although the farmers had been notified rather late of the change in regulations, twelve associations agreed to take part in these seed competitions. In one county, the board of directors of the association decided to distribute registered seed of a similar variety of oats to each of their competitors. There were fourteen entries and all the competitors were visited during the summer by the secretary of the Canadian Seed Growers' Association and by a representative of the provincial department.

It is generally expected that over 5,000 bushels of registered Banner oats seed will be produced out of this one competition.

The judges were gratified to note that all the farmers entered were in earnest and had succeeded in obtaining seed of high grade quality.

Several other counties also gave special attention to these seed competitions and although there is still much to do, the results so far obtained in this direction show us that this system will enable us, before long, not only to stimulate but to control the production of pure and selected seed.

STANDING CROP COMPETITIONS

In addition to the seed competitions and in order to provide for associations that are not as yet quite ready to launch into this line of work, a special grant for the holding of standing crop competitions was offered by the Quebec Department of Agriculture, in co-operation with the Dominion Department of Agriculture.

Each association could arrange for five competitions, varying with the number of its members and on

the following crops,—wheat, oats, barley, peas, clover, timothy, corn, potatoes and beans. No field could be entered that measured less than three acres for oats and wheat, two acres for barley, peas, and corn, and one acre for clover, timothy, potatoes and beans. A grant of \$75 was made to each competition in which at least twenty farmers participated.

A slight reduction was observed in the number of regular standing crop competitions on account of the changes in regulations, but on the other hand the number of entries

was much greater than in preceding years.

In the 161 competitions organized this year, there were 3,809 competitors as compared with 174 competitions and 2,656 competitors last year.

It is hoped that the standing crop competitions may be gradually replaced by seed competitions.

This new legislation will enable us to better encourage and much more easily control the production of pure seed of a similar variety in each district, and we believe that this is the object that should be sought.

DEMONSTRATION ORCHARDS

BY ARMAND LETOURNEAU, B.S.A., JOURNAL OF AGRICULTURE

DURING the year 1920, an endeavour was made to give a new direction to our demonstration orchards. Heretofore, the

one. A new programme was planned in 1914, and without neglecting the educational work in better methods of production, we have tried, in



SEEKING THE CAUSE OF UNTHRIFT IN TREE

object of these orchards had been to make known the modern methods of fruit culture; in other words, the question of production was the main

addition, to standardize the products for the trade. It is endeavoured, through these orchards, to educate fruit growers in the questions of

marketing, grading, packing and co-operative selling.

It is perhaps a little too early as yet to give the results of such work. It should be mentioned however that we are now making an experiment in the co-operative selling of

Apple boxes were supplied by the Horticultural Division to the members of this Association at a lower price than the regular trade price. A very active campaign was also started by the Horticultural Division



HARVESTING THE APPLE CROP

fruit. Recently, an official representing the members of the pomological society was assigned the duty of centralizing the sales in Montreal and of giving information to growers on the requirements of the market, grading, etc.

in 1920 to develop the intensive growing of small fruits. A few thousand strawberry plants were distributed. Before long, a report of results will be given which, we hope, will be quite satisfactory.

DIRECTOR AT THE OKA AGRICULTURAL INSTITUTE

REVEREND Father Leopold, O. C. R., professor of fruit growing at the Oka Agricultural Institute since 1910, has been appointed Director of the Institute.

Reverend Father Leopold was born in 1884 at Nassau, the capital of the

Bahama Islands. He came to Canada in 1891 and began his studies at Ste. Marie College in Montreal, later entering the Montreal College from which he graduated after a stay in Europe. He entered la Trappe of Oka in 1901, was ordained priest in 1907 and appointed professor of

fruit growing in 1910. The following year he went to Europe to study agriculture and especially pomology. He studied at the National School of Horticulture of Versailles, at the University of Angers, and, in 1912, at the Ontario Agricultural College, at Guelph.

Father Leopold is ex-president of the Fruit Growers' Association of the Province of Quebec and has been a director of the association for the past ten years. He is vice-president since 1917 of the Association for the Protection of Plants against insect pests and fungous diseases. In 1914 he published a treatise on fruit culture in the province of Quebec.

SHEEP DIPPING IN L'ISLET COUNTY

BY GEO. J. BOUCHARD, B.S.A., AGRICULTURAL REPRESENTATIVE

SITUATED between the St. Lawrence river and the United States boundary, some fifty miles below Quebec, the county of L'Islet offers exceptional opportunities for the rearing of sheep. With the exception of a level stretch of

flocks, especially of the Leicester breed, are thriving, but much remains to be done in the way of improvement. It has been noticed for some time that skin parasites cause great damage in checking the growth of the animals and depreciating the



THE DIPPING VAT AS USED

land a few miles deep, the country is fairly rolling, like all of the territory traversed by the Alleghanies.

The scarcity of men, the character of the farms, and the natural advantages, all favour the development of sheep breeding. Some pure-bred

value of the wool. To control this foe, an instructor of the Dominion Department of Agriculture, Mr. Evangeliste Poulin, B.S.A., was called to our help. The first demonstrations given in 1919 were very helpful. After witnessing at shearing time the

benefits of sheep dipping, we endeavoured to generalize the system by a very simple process. A vat and a platform, for transportation by rail, had been prepared by the Dominion Live Stock Branch. Mr. Roy, agricultural representative of Compton, had a similar apparatus set on four truck wheels. This gave efficient but rather slow service. These two outfits gave us the idea of another one, which was constructed with the authorization of the Hon. J. E.

down on the cart and secured by two leather straps. This outfit may be transported quickly and at little expense. Behind an automobile, or even a motor cycle, the bath has travelled at a speed of forty-five miles an hour without being damaged.

By this arrangement two men were able in one day to dip more than ten flocks. More than twelve agricultural representatives use this system



DIPPING TANK MOUNTED FOR MOVING

Caron, Minister of Agriculture for Quebec. This outfit, which is both light and strong, may be transported and set up rapidly. It includes a small carriage set on two Ford wheels, and hung by two lateral springs. The bottom of the carriage is of galvanized iron, over which is a rack facilitating the drainage of liquid, and preventing the sheep from slipping. A pole with a spring at the end is easily fastened to a connecting piece set on the auto. For transportation, the bath is turned upside

down on the cart and secured by two leather straps. This outfit may be transported quickly and at little expense. Behind an automobile, or even a motor cycle, the bath has travelled at a speed of forty-five miles an hour without being damaged. By this arrangement two men were able in one day to dip more than ten flocks. More than twelve agricultural representatives use this system of demonstration. The insecticide used for this work is a sheep dipping powder sold for forty-five cents a pound. Thirty pounds of this powder is sufficient for fifty gallons of water. Twenty-five gallons is sufficient for the dipping of small flocks of a dozen sheep. Calves and pigs are dipped exactly in the same fashion but for the latter a good brushing is necessary while dipping. During the summer the flocks of sixty farmers were used for demonstrations.

DEMONSTRATIONS ORGANIZED

BY C. H. HODGE, B.S.A., PONTIAC COUNTY AGRONOMIST

REALIZING the importance of demonstrations in introducing new methods and securing their early adoption, all the time that could possibly be spared from the work of school fairs, co-operative associations and other routine work has been devoted to the organizing of demonstrations in different localities in the county. These demonstrations, with some of the results obtained, may be roughly grouped under three headings.

1. *New Methods.* Practical demonstrations in the shearing, rolling,

and tying of fleeces have been given throughout the county during the past five years with the result that 75 per cent of the wool sold in the county comes to the grading station in a proper condition for grading and sale. This improvement in preparation combined with co-operative marketing has brought the farmers a decided increase in financial returns, as the following statement from the books of the Co-operative Association reveals.

Year	Lbs. wool sold	Association Average Net price to farmers	Average local price	Profits accruing to Farmers
1915.....	43,996	32 cents	25 cents	\$3,079.72
1916.....	52,899	41 "	36 "	2,644.93
1917.....	46,316	52 "	50 "	926.32
1918.....	43,642	70 "	63 "	3,463.12
1919.....	42,491	57 "	50 "	2,974.37

Demonstrations in docking and castration of lambs have given a similar result in the improvement of the mutton product, with increased returns to the farmers, although there are no figures available on this work.

In 1919 the value of crate fattening poultry followed by better methods of killing, plucking and packing was demonstrated in several localities, with the result that those farmers who adopted it received an average of 10 to 15 cents per pound more for their poultry in the fall.

2. *New Varieties.* Illustration fields demonstrating the value of new and improved varieties of grains and clovers have been established at different points in the county and have given good results. For instance a field of Grimm alfalfa seeded in August, 1917, on a summer fallow,

has given the owner a fair crop of hay and a good crop of seed each year in 1918, 1919, and 1920, and by cultivation in June of this year and seeding the bare spots he has a better stand to-day than he had in 1918, and this in spite of the fact that during the past winter 95 per cent of the Red Clover here was completely winter killed.

Several illustration fields of fall wheat sown on land from which a crop of peas had just been harvested gave excellent returns in 1919, but owing to the severity of the past winter they were badly winter killed, and had to be reseeded this spring.

3. *Treatment for Insects and Diseases.* Demonstrations in pruning and spraying of orchards have been given in a few localities and have resulted in some improvement in the quality of local fruit, but the

orchards are not numerous and are in many cases badly infested with canker so that the planting out of new orchards is the principal need at present.

Spraying fields of potatoes in different centres for the control of late blight and rot has given good results. In 1919 the average increase from six fields, sprayed four times, was 60 bushels to the acre and blight was not very serious. This year results from the three fields from

central farms, mixing the dip and putting them all through. In this way several hundred sheep may be dipped in a day at a cost of 2 to 4 cents per head, depending on the number in one centre and the length of the fleece. This work has led to the establishment of a number of private dipping tanks and in at least one case, a farmer has constructed a cement tank large enough in which to immerse a crate holding one or two cattle or three or four sheep, and



THE VALUE OF SPRAYING DEMONSTRATED

which records have been received to date, show an average increase of 150 bushels to the acre from five sprayings and in fields where the rot was affecting them seriously the sprayed portions showed little evidence of disease.

Sheep dipping demonstrations have been given in many centres in the county. The usual method followed being to assemble 100 to 200 sheep in a neighbourhood, setting up a portable tank at one of the most

intends dipping both his cattle and sheep.

With the material available from the agricultural colleges and experiment stations many other demonstrations might be carried on, but in order to reach the many localities in a large county time will not permit of a very great variety in any one year. It is, however, interesting and instructive work and well worthy of all the time that any district representative can devote to it.

ONTARIO

THE BETTER BULL CAMPAIGN

BY R. W. WADE, B.S.A., SECRETARY, ONTARIO CATTLE BREEDERS' ASSOCIATION

A CAMPAIGN to bring about an improvement in the bulls used by Ontario farmers has been organized by the Ontario Cattle Breeders' Association. The work is being carried on under the supervision of the Live Stock Branch of the Ontario Department of Agriculture with the assistance of the Live Stock Branch of the Department of Agriculture at Ottawa. The campaign is intended to improve all classes of cattle in the province and was planned under the following heads:—

Advertising.—The advertising will be carried on in farm papers, daily papers, and local papers.

Newspaper Articles were prepared by leading live-stock men in Canada and furnished to the papers with illustrations.

Posters.—Metal signs were printed for each of the breeds and were given free to farmers who used a pure-bred bull on their farms. This sign is put up in a prominent place. Mr. McVannel, Agricultural Representative, Prince Edward county, reports that nearly every pure-bred owner in his county has a sign posted up.

Educational work to County Representatives.—Every representative is informed of the work going on in other counties. A copy of each advertisement is sent out before insertion and electros are sent to them for use in their own local papers.

One feature of this campaign is the fact that it has gained the co-operation and confidence of the agricultural representatives, whereas previous advertising tended to override them. They are made to feel that they are a part of the organization carrying on this campaign and often they submit specific instances of herd improvement by the use of good pure-bred bulls.

Field Work.—For the first year, eight of Ontario's best counties were selected for actual demonstration, and fieldmen are at work in those counties giving lectures and also personal assistance in choosing good bulls for farmers who want to buy and also helping them in disposing of the scrub bulls.

A complete analysis is made of each county. Every farmer is listed and a note is made as to what breed, kind of bull, etc., he keeps. If a farmer has some good looking young bulls a record is also made of that, because these bulls may be bought later and placed elsewhere.

It is planned to take in a number of new counties each year. Of course the ones in which work is carried on this year will still be continued. Although only eight counties are being actively organized this year, the other counties are being made acquainted with the work going on, by advertising and through the agricultural representatives.

Motion Films and Picture Slides.—Through the Ontario Motion Picture Bureau pictures were made at various farms, showing good and poor live stock. In some cases pictures were made showing actual results of improvement, that is showing the sire, the dam, and the progeny. Still photographs were made showing steers at the stockyards, Toronto—steers which got the high prices and steers which got the lowest prices; the good ones were sired by good bulls. Prize-winning animals at the Canadian National Exhibition at Toronto, have been taken, and motion pictures of these will be available during the fall and winter.

Exhibition and Fall Fair Work.—Reproductions were made on large canvas sheets of some of the advertisements. Enlarged photographs of good and poor live stock were used. Posters giving actual figures are made, and profits produced by the good herd are displayed. Every piece of literature that goes out is identified with the campaign by the triangle "BOOST BETTER BULLS," and the slogan "USE BETTER BULLS."

Miscellaneous Advertising.—Various kinds of printed matter have been used and disseminated to banks, schools, agricultural representatives, and agricultural societies.

Dozens of electros were made of the triangle and sent to breeders to use in their own advertising, and also to a great many business houses in towns and villages.

The whole idea of this campaign was to get all who are interested in agriculture, the farmer, the rural banker, the county agricultural representative, the executives

of fall fairs and exhibitions talking about breeding better live stock, so that everywhere people would encounter the slogan "USE BETTER BULLS."

Furthermore, all this had to be done in such a way as to not give offence to the very ones for whom it was intended.

The idea is to secure the confidence and heartiest co-operation of the farmer, agricultural representative, and all those who are interested in "Better Live Stock."

ADVERTISEMENTS

An important feature of the publicity campaign has been the issuing of striking advertisements each calculated to impress an important lesson. The advertisements were issued as numbered bulletins.



BULLETIN NO. 8 ILLUSTRATED

Bulletin No. 1.—The story of live-stock conditions in Ontario, showing actual figures of the great loss.

The reason for this loss.

Showing instances why better beef and dairy bulls should be used as a method of improvement, and how to proceed.

Bulletin No. 2.—The story of Ontario's beef production, and what Ontario would have gained had breeders used "better bulls."

Bulletin No. 3.—This gives the story of Ontario's dairy cattle, and by comparison shows that Ontario lost over sixteen million dollars by keeping cows of nondescript breeding.

Bulletin No. 4.—A summary of the advantages of a pure-bred bull.

Bulletin No. 5.—An actual instance of what a good dairy bull did for one herd. Within a period of five years the owner received \$551.72 more for milk from the same number of cows, direct descendants of the former herd, but sired by a good, pure bred-bull.

Bulletin No. 6.—"A Scrub Bull's Confession." This advertisement was written with a view of showing the scrub owner the kind of bull he had at the head of his herd.

Bulletin No. 7.—Actual photographs of two calves—one sired by a scrub bull, the other by a pure-bred bull. The calves were born the same week, and the photographs were taken the same distance from each animal.

Bulletin No. 8.—"One Cow equals Three Cows." Actual photographs of dairy cows. The Oxford County records were used to show the increased profit by use of a pure-bred bull over a period of years.

Bulletin No. 9.—A comparison of two lots of steers was made, showing the actual weight and the actual price obtained for each lot. One lot that were from grade cows and sired by a pure-bred bull, weighed on an average 720 pounds more

than the scrub lot, and sold for 7½ cents per pound more than the scrub lot. Both lots were practically the same age, and the better steers returned \$240 per steer, as compared to \$61.50 for each scrub steer.

Bulletin No. 10.—Showing a contrast in two herd sires. One a scrub which was found by one of the fieldmen at the head of a herd; the other a pure-bred that demonstrated his value to the owner.

Bulletin No. 11.—"Cow before the Jury." This advertisement gives actual figures of profit and loss for both good and poor cows.

Bulletin No. 12.—Improvement in a dairy herd by the use of good pure-bred sire and the increasing returns as the herd increases in pure-bred blood.

Bulletin No. 13.—Gives an actual case of improvement in a beef herd by the use of a pure-bred sire, and shows the dollars and cents profit the owner gets over what he used to get from animals of nondescript breeding.

It will be noticed that throughout the whole campaign both the dairy and beef cattle had to be taken into consideration, and this was done without offence to either breed.

In addition to the work as outlined, the Ontario Cattle Breeders' Committee furnished one community with a small pure-bred herd. In this community formerly out of thirty-five bulls only two were pure-bred. It is hoped that they will be able to secure from the stock furnished sufficient good breeding males to eventually eliminate entirely the scrub bulls in that district.

It is intended to carry on the campaign as strongly as possible

during the winter months and to secure if possible local organizations which will work in co-operation with the Cattle Breeders' Committee either to assist in exchanging pure-breds for scrubs; holding auction sales, to give an opportunity to sections where pure-bred bulls are very much needed; holding exchanges, where bulls may be kept for a few weeks to give farmers an opportunity to secure same at a minimum cost, and in trying to obtain the closest co-operation of the various breed associations, in order that improvement of live stock both by the cattle breeders and the various breed organizations may be co-ordinated and strengthened.

FARM MANAGEMENT INVESTIGATIONS

BY ANDREW LEITCH, PROFESSOR OF FARM ECONOMICS AND DIRECTOR OF FARM SURVEYS

DURING the year just ended the Department of Farm Economics was established at the Ontario Agricultural College. This department is the logical result of the farm management surveys conducted by the Ontario Department of Agriculture. The new department in its purpose is two-fold; (1) to conduct detailed investigations into the business of farming and the cost of production of farm products, giving publicity to the economic conditions of farming and the farm methods and organization that make the greatest financial returns, (2) to present to the students of the Agricultural College a course in the business of farming in all its aspects, based on information derived from the investigational work conducted. The instruction work is of course, included in the regular College curriculum and activities. The investigational work is still under the direct control of the Minister of Agriculture in common with all other extension work in agriculture. Both branches of the work are under the direction of the Professor of Farm

Economics and Director of Farm Surveys.

During this year the following work of investigation has been conducted:

(1) The four surveys of 1919 were analyzed and the results published in bulletin form. The bulletins issued were the following.—No. 275 entitled "The Dairy Business in Western Ontario." This bulletin represented the conditions in Oxford county. "The Beef Raising Business in Western Ontario" as conducted by the Middlesex County Survey was expressed in bulletin No. 278. "The Mixed Farming Business in Western Ontario" was brought out in a bulletin which covered conditions in Dufferin, Peel, and Wellington counties. "The Dairy Farming Business in Eastern Ontario" was represented in a bulletin based on the survey made in Dundas county.

(2) Continuation for the third consecutive year of the survey of Oxford county.

(3) Continuation for the second year of the survey of beef farms in Middlesex county.

(4) Continuation for the third year of the mixed farming investigation in the counties of Dufferin, Peel, and Wellington.

(5) With a desire to obtain more complete and more accurate record of the business of each farm, there was this year inaugurated a change in the method of obtaining farm statistics. Instead of waiting till the end of the year to obtain the full details of the year's farm business, depending on the farmer to keep the necessary record of his financial transactions, the department made regular calls on the farmers in the counties of Oxford, Middlesex, and Dufferin, during the current year, to get from the farm a record of all transactions before they were forgotten. As this system has been in effect but part of a year, judgment on its efficiency has necessarily to be suspended.

(6) The commencement of a survey of mixed farms in Durham county, on which farms apple growing is an important enterprise. This investigation covers the year ending April 30, 1920. A report on this survey is about ready for publication.

(7) A survey of the fruit district in the Niagara peninsula for the year beginning January 1, 1920, was commenced in July, 1920. This investigation is being conducted under a somewhat different plan to the other surveys. The farm inventories (land, equipment, live stock, etc.) for the beginning of the year were taken and each farmer was provided with proper sales and expense blanks on which to keep the large number of such business items as occur on a fruit farm. At the end of the year the farms will be visited for the purpose of collecting these blanks and making the inventories for the end of the year.

(8) An extensive programme of detailed farm cost accounting is one of the new features of the year just ended. On 25 Oxford County farms and 25 mixed farms in and around Dufferin county the department has

installed a system of detailed cost accounts, under the direction of Mr. C. F. Luckham, B.S.A. This work involves the keeping of the complete details of a farm business year, hours of labour on each crop and each class of live stock, feed used by each kind of live stock, equipment on each crop and all similar details of farm business. By means of this investigation it will be possible to procure absolutely accurate information on the cost of production of all farm products and absolutely definite statistics on all matters of farm organization and management.

(9) For the use of the Provincial Milk Commission the department carried to completion detailed investigations into the cost of producing milk on 100 York County milk shipping farms. This involved a detailed study of the amounts and values of the different items that enter into the cost of a can of milk,—feed, labour, depreciation, use of buildings and equipment. This investigation had much to do with the final settlement of this vexed question and helped to assure the milk shipper of a price for his product sufficiently attractive to encourage him to remain in the business, the final result of which will be a more reasonable cost to the consumer.

(10) Each of the 1,400 farmers from whom information was received in the four surveys of 1919 was supplied with a detailed analyzed report of his own business presented in such manner as to enable him to compare his own business with that of others conducting a similar business, thereby giving him an opportunity to strengthen the weak spots in his farm organization from a study of the actual effect of various changes in farm organization.

The instruction work with students of the college was started in the fall of 1919. This work falls into two classes,—farm organization and management, and farm book-keeping and accounting. It is the aim of the

department to give each student a thorough grounding in farm book-keeping, cost accounting, methods of analyzing farm business and all matter relating to the conduct of business transactions that arise on the farm. Moreover, it is desired to give full information on farm management problems, the financial condition of various types of farming and the effect on farm profits of the different kinds of farm organization.

This branch of the work will proceed as speedily as basic information on this subject is obtained by the investigations.

The department has also under consideration, plans for the inclusion of investigation into co-operation and marketing questions that arise in farm business, and for the expansion of farm management studies to include other sociological factors of the farm and farm family life.

LIVE STOCK JUDGING FIELD DAY

BY J. A. CARROLL, B.S.A., AGRICULTURAL REPRESENTATIVE

THE first effort of the Peel Junior Farmers' Association since their confederation in May was to organize a stock judging field day. This was held in Brampton on November 5, and was very successful. Thirty-two contestants, from all parts of the county commenced work at 10 a.m. and had finished judging and giving oral reasons on ten classes by 6.30 in the evening. Worthy classes of stock had been brought into the town by public spirited farmers which enabled the boys to work more conveniently than if compelled to drive from farm to farm. Four classes were judged and oral reasons were given for the placings. The best judges available were secured to handle the competition.

In the evening a banquet was held at which addresses were delivered

by the Deputy Minister of Agriculture, Geo. E. Day, Secretary Dominion Shorthorn Breeder's Association, and Jas. R. Fallis, a local breeder.

The classes judged were dairy cattle, beef cattle, horses, sheep and swine. In each class five prizes ranging from \$8 to \$2 were provided, and a shield was donated by Frank R. Petch to the winner of the highest aggregate in beef and dairy cattle. Three grand championship awards were also provided, these, for the first and second prizes were the railway fare and expenses to the Chicago International Show. The third championship prize consisted of a two weeks' course at the Ontario Agricultural College in January, including all the expenses.

PLOUGHING MATCHES

BY W. M. CROSKERY, B.S.A., AGRICULTURAL REPRESENTATIVE

TWO ploughing matches were held in Grenville county this year being the first annual ploughing matches held under the auspices of the Grenville County Ploughmen's Association. A young men's ploughing competition was held immediately following the

regular match. The latter was held at the Kemptville Agricultural School farm and the former at the homes of the competitors.

In the county match three classes were provided and included single furrow walking ploughs in sod open to all, single furrow walking ploughs

in sod open to boys under twenty, and two furrow ploughs open to all. Twelve ploughmen from five townships in the county competed.

The young men's ploughing competition is an annual one conducted by the Grenville branch of the Ontario Department of Agriculture. Twenty young men representing every township in the county competed. The ploughing in this competition had to be done on the home farm or on the farm where a contestant was working. Three classes were provided:—

Class 1. Single ploughs, with skimmers, in sod, open to men over twenty and under thirty years of age; two acres in one block had to be ploughed.

Class 2. Single ploughs, with skimmers, in stubble, open to young men

twenty years of age and under; at least two acres in one block had to be ploughed.

Class 3. Two furrow ploughs, in stubble, drawn by three horses; three acres in one block had to be ploughed.

The judge took into consideration the condition for the following year's crop as well as the crown, the finish, and the general land. The score card provided twenty-five points for general appearance; twenty-five points for straightness, evenness and depth; twenty points for packing and skimming, and fifteen points each for crown and finish. The prizes, five in each class, included medals for the first, eight dollars for the second, graded down to two dollars in each case for fifth. Winners of medals of previous years could not again win medals in the same class.

SHEEP HUSBANDRY DEMONSTRATIONS

BY T. STEWART COOPER, B.S.A., AGRICULTURAL REPRESENTATIVE

GREY County possesses great possibilities for sheep raising. In the past the ordinary methods of sheep husbandry have been practised. Sheep dipping has been largely neglected, docking seldom, and castrating practically never done. The result has been that premiums for wool and mutton lambs have never been received and many are viewing the sheep industry with an indifference which discourages the sheep enthusiast and militates against the greatest development of the industry.

The county of Grey during 1919 sold 29,560 sheep in Toronto and up to the end of September this year sold approximately 18,000 head. In yearly sales Grey county has been holding second place but up to the present it holds first position in number of shipments this year.

During the past summer, the Federal Live Stock Branch sent a demonstration dipping outfit to Grey county. The work was under the charge

of Mr. Jas. Telfer, Sheep and Goat Promoter, and was assisted by Mr. Clare Geddes, directed by the agricultural representative at Markdale. Fourteen sheep-dipping demonstrations were conducted in the sixteen townships of the county. An endeavour was made to locate the outfit at the most central point in each township or in the districts where the greatest number of sheep were produced. In the fourteen demonstrations which were conducted between July 2nd and July 23rd, 8,731 sheep were put through the dipping vats.

The demonstration outfit used consists of a steel galvanized tank 3 feet 10 inches deep and 8 feet long on the top, tapering at one end to 4 feet long on the bottom. It was 20 inches wide on top and tapered gradually on both sides to 12 inches wide on bottom. It had a capacity of 175 gallons of water into which was placed $1\frac{3}{4}$ boxes of sheep dipping powder. Each box holds approximately seven pounds of powder. The tank was

furnished with two sections of dripping platform and sides so constructed that they would lie snugly on the bottom of a Ford truck. There were several hurdles to enclose the sheep while they were being held preparatory to the bath. The reports received from the owners of the flocks indicate that even with one dipping the work was very complete, as only two farmers have stated that practically all the ticks in the flock were not destroyed.

FUTURE SHEEP WORK

The start that has been made will be continued. A follow-up scheme must be provided and this is being done by means of demonstration flocks among the young farmers.

The Provincial Live Stock Branch is giving ten or twelve ewes to each of ten boys this autumn. They agree to supply an first quality Shropshire sire for use till final settlement has been made. On their part the boys agree to dip twice per year; dock all lambs, castrate the males, report co-operative wool sales, and sell the lambs co-operatively on the Toronto market. The sheep will be returned to the Department as follows: three shearling ewes in each of the years 1922, 1923, 1924 and 1925, after which the flock becomes the property of the young man who has taken them. It is expected that the sheep that are returned will be used to found other flocks by having boys take them under the conditions of the distribution.

MANITOBA

CONFERENCE ON GRASSHOPPER CONTROL

A CONFERENCE to discuss grasshopper control in the Prairie Provinces was held in Winnipeg on October 8th and 9th. The conference was called by Mr. J. H. Evans, Deputy Minister of Agriculture for Manitoba and was attended by the Ministers and Deputy Ministers of Agriculture of Manitoba and Saskatchewan, the Deputy Minister of Agriculture for Alberta, the Field Crop Commissioner for Saskatchewan, the Dominion Entomologist, and other federal and provincial officials who are especially concerned with the subject. The state of North Dakota was also represented by the Extension Entomologist.

Control and investigation work carried on this year was reviewed and plans made for next year. In Saskatchewan the campaign was organized on a semi-military basis in charge of a director-general, quartermaster, chief field director, and other officers so directed as to secure the action of farmers in all the affected

districts. In this province alone supplies furnished within the municipality amounted to 2,720 tons of bran, 225 tons of sawdust, 112,636 gallons of molasses, 2,805 cases of lemons, 166 tons of arsenic, 34 tons of paris green, and one barrel of amyl-acetate. The total cost, including transportation, amounted to \$337,820.19. It was estimated that 1,400,000 acres of crop were actually saved by the treatments.

In the Manitoba organization, each municipality was regarded as a unit, and worked accordingly. Mixing stations were established in the towns where farmers could obtain the poisoned bait readily. Each farmer was made responsible for the treatment of his own land and the side of the road allowances adjoining his farm. Waste places were taken care of by the councils by hiring men to do the work. The Manitoba Government bore the whole cost of the materials for the poisoned baits, the local councils provided for the mixing of the materials and for its

distribution. The poisoned bait distributed amounted to 1,659,100 tons. The crops saved by the treatment were estimated at a value of \$17,-084,717.

Mr. Stewart Lockwood, the representative from North Dakota, reported outbreaks in some of the counties adjoining Saskatchewan. No organized control work had been effected resulting in a loss estimated at 16 per cent of a total area of 300,000 acres. It was estimated that 58 per cent of the grasshoppers in the adjoining counties migrated to Canada. A campaign of control will be put into effect in North Dakota next year.

During the campaign federal and provincial officials worked hand in hand with the utmost harmony. Mr. Norman Criddle representing the federal Entomological Branch spent much of his time visiting infestations, assisting at the mixing stations, and generally advising as to the technical issues of the campaign.

Mr. Arthur Gibson, Dominion Entomologist, expressed the utmost satisfaction with the spirit of co-operation that had been shown between the federal and provincial

departments. He dealt with investigational work that had been conducted by the Entomological Branch under the immediate direction of Mr. A. Kelsall, who had conducted experiments with new poisoned baits, dusts, contact sprays, and poison gas.

It was agreed by the provincial and federal officials attending the conference that there was every likelihood of another serious outbreak of the grasshoppers occurring in 1921. In order to deal with this new outbreak by the most satisfactory method it was decided to appoint a committee representing the provinces and states interested. The following committee was therefore appointed: Messrs. Norman Criddle, Chairman; M. P. Tullis, Saskatchewan; A. V. Mitchener, Manitoba; Stewart Lockwood, North Dakota. The duty of this committee will be to organize definite co-operative plans for 1921 in order that there may be no friction of any kind with regard to remedies suggested or other means of control decided upon. This committee will confer by correspondence and will doubtless meet in good time before the season's work of 1921 is under way.

POTATO IMPROVEMENT

BY GEO. BATHO, EDITOR OF PUBLICATIONS

FOR the past two or three years a steady effort has been made to improve the quality of the potato stocks in Manitoba. Each winter the Department of Agriculture has distributed posters all over the province calling upon farmers to avoid sowing mixed varieties, to adopt one type of potato in a district, so that surplus amounts could all be shipped in the same car, and to use formaldehyde to kill scab. In addition, a good deal of literature has been distributed during the

summer relating to diseases which show themselves above ground and to the destruction of potato beetles.

Early in the spring of 1919 the Manitoba Potato Growers' Association was formed. This association approved of the encouragement of four main types of potatoes for the province: the Early Ohio type; Beauty of Hebron (or Bovee) type; Irish Cobbler type, and Green Mountain type.

The Department of Agriculture and the Agricultural College have done

whatever has been possible since that time to promote the popularizing of these types, and to inform the public as to what varieties of potatoes are included in each type approved.

This spring a quantity of certified Irish Cobbler seed potatoes was purchased by a group of farmers at Virden, and the product having been duly inspected and certified, the available surplus was purchased by the Agricultural Extension Service for distribution next spring among the Boys' and Girls' Clubs. It is hoped to introduce pure, disease-free, approved potato stocks into many districts in this way, at the same time giving to the club members a considerable body of information in connection with the growing of this crop.

Mr. F. H. Newcombe, Agricultural Representative at Selkirk, has also been especially active in interesting the farmers of his district in potato improvement, and has placed a large order with growers of certified seed at Dryden, Ont.

The department, in a recent poster, pointed out that this was a particularly favourable season to secure improved stocks because the local potato crop is so light that in many cases importations of potatoes are being made. The cost involved in disposing of all mixed or inferior stocks and their replacement by improved pure varieties is therefore relatively small, and involves little extra trouble. It would seem as though quite a number of people were following the suggestion.

APPOINTMENTS AT THE AGRICULTURAL COLLEGE

SIX appointments have recently been made to the staff of the Manitoba Agricultural College. G. L. Shanks, B.S.A., has been appointed Professor of Agricultural Engineering, succeeding Professor L. J. Smith, B.S.A., who recently resigned to take a position with the State College of Agriculture, Pullman, Washington. Professor Shanks is a native of Manitoba. He took the degree course at Manitoba Agricultural College, graduating with honours in 1912. For a time he served with the agricultural schools in Alberta, but about three years ago he was appointed as lecturer in agricultural engineering.

Dr. C. B. Clevenger, Ph.D., has been appointed Professor of Agricultural Chemistry. Dr. Clevenger took his under-graduate work at the University of Ohio. He was for four years on the Soil Fertility Division of the Agronomy Department at the University of Illinois, and took his Ph.D. in the Soils Department at the

University of Wisconsin. He was lecturer in chemistry at the latter institution immediately prior to his accepting work here.

Guy R. Bisby, Ph.D., was appointed professor of plant pathology at the Manitoba Agricultural College last June, and has since been doing plant disease survey work in the province during the summer.

Dr. Bisby is known throughout the United States for his work on potatoes. First, in the state of Maine; then in Long Island; and later, on the War Emergency Board for the Great Plains.

He obtained his degree on studies of fusarium diseases of potatoes and truck crops in Minnesota. He also worked with J. C. Arthur on Rusts, Uredinales on Onagraceae; Short Cycle Uromyces of North America; and translation of Schweinitz papers on Rusts of North America. He has written many bulletins on potato diseases.

Mr. H. B. Summerfeld has been appointed instructor in animal husbandry. Mr. Summerfeld is a graduate of the College of Agriculture at Saskatoon. He specialized in animal husbandry and will devote his chief attention to instruction work on horses and beef cattle.

Mr. A. E. Johnson, M.A., also from the University of Saskatchewan has been appointed lecturer in English.

Mr. Johnson was for three years overseas with the 11th Field Ambulance.

Miss Lenora Panton, a graduate of Macdonald Institute, Guelph, has been appointed Dietitian in succession to Miss Olive Cruikshank, who resigned to accept the position of Director of Home Economics at Macdonald Institute. Miss Panton has been Dietitian at Queen's Hall, Toronto.

ALBERTA

COMBINED COURSE IN ARTS AND AGRICULTURE

BY E. A. HOWES, B.S.A., DEAN OF AGRICULTURE

THE Senate of the University of Alberta has authorized the College of Agriculture to institute a combined course in arts and agriculture. By this course a student having matriculation standing for entrance may secure both degrees, B.A. and B.S.A., in six years.

The course as outlined will consist of work in the Faculty of Arts during the first two years. In the third year begins the instruction of science subjects which are foundational to the course in agriculture, along with other courses in the regular arts work. The last three years are practically all agriculture, but these also include work in English, mathematics, and political economy.

It might be explained that this course aims to supply a need felt in connection with high school work. The high school course of studies for Grade XI in the Province of Alberta, includes a rather comprehensive course in agriculture. Up to the present time this has been taken care of largely by the regular teachers of science. In the schools, the trend of the work must be obvious since these science teachers have not been trained in agriculture. It is felt that a graduate in arts and agriculture should be in a position to undertake the science work in high schools and be at the same time equipped with an agricultural training. Of course the advantage of this combined course over any single course is also obvious.

BRITISH COLUMBIA

APPROPRIATIONS FOR AGRICULTURE

THE appropriations voted by the legislature of British Columbia to be administered by the Agricultural Department was omitted from the review of the legislation that appeared on page 824 in the October number of the Agricultural Gazette. Following are these appropriations:—

	1919-20	1920-21
Minister's Office.....	\$11,140	\$11,380
General Office.....	43,144	40,458
Horticultural Branch....	56,900	98,496
Live Stock Branch.....	35,780	60,172
Tubercular cattle Compensation, etc.....	33,500	30,000
Automobile accessories..	4,250	6,000
Agricultural fairs, etc...	35,000	35,000
Farmers' Institutes, etc.	10,000	9,000
Women's Institutes, etc.	8,000	7,000
Grants to associations...	14,000	40,250
Collection of agricultural statistics.....		4,720
Board of Horticulture...	500	300
Departmental exhibits...	2,000	3,000
Compensation <i>re</i> foul-brood in bees.....	1,000	500

	1919-20	1920-21
Control of noxious weeds	1,000	1,000
Grants to British Columbia students.....	1,000	1,000
Agricultural and Horticultural instructors and Agricultural Representatives.....		25,960
Incidentals and contingencies.....		1,500
Total.....	\$257,214	\$375,736

Agricultural instruction carried on in the public schools and collegiate institutes is conducted by the Department of Education through a system of district supervisors. To provide for this work the province contributes through the Department of Education \$30,530 to which is added \$20,000 provided by the Dominion Government under the Agricultural Instruction Act.

STUDENT ENROLMENT

THE following are the numbers of students enrolled for the college year in the agricultural colleges and schools of agriculture in Canada.

NOVA SCOTIA AGRICULTURAL COLLEGE

Senior year.....	35
Junior year, associate diploma.....	32
Junior year degree course.....	22
Total junior year.....	89
Special soldier's course.....	9
Total enrolment.....	98

MACDONALD COLLEGE

<i>School of Agriculture—</i>	Men	Women	Total
First year.....	7	—	7
Second year.....	25	1	26
Third year.....	17	—	17
Fourth year.....	24	2	26
Winter course.....	16	—	16
Postgraduate student.	1	—	1
Special student.....	1	—	1
Total.....	91	3	94

School of Household Science—

Institution Administration, Senior.....	—	6	—
Institution Administration, Junior.....	—	4	—
Homemakers.....	—	47	—
Autumn short course.....	—	17	—
Total.....	—	74	—

SCHOOL OF AGRICULTURE, STE. ANNE DE LA POCATIERE, QUE.

Degree Course—

First year.....	27
Second year.....	8
Third year.....	6
Fourth year.....	9
	50

Practical Agriculture—

First year.....	26
Second year.....	13
	39
Total.....	89

AGRICULTURAL INSTITUTE, LA TRAPPE,
QUE.

First year.....	44
Second year.....	8
Third year.....	19
Fourth year.....	9
Practical Agriculture.....	25

Total..... 105

ONTARIO AGRICULTURAL COLLEGE

Agriculture—

First year Associate Course.....	68
First year Degree Course.....	53
Second year.....	156
Third year.....	85
Fourth year.....	84

Total..... 446

Home Economics—

Sr. Housekeepers.....	8
Jr. Housekeepers.....	18
Sr. Normals.....	13
Jr. Normals.....	13
Sr. Associates.....	18
Jr. Associates.....	24
Homemakers'.....	25
Short Course.....	12
Optional course.....	1
Student Worker.....	1

Total..... 133

KEMPTVILLE AGRICULTURAL SCHOOL

Regular Course.....	25
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MANITOBA AGRICULTURAL COLLEGE

Agriculture—

First year.....	90
Second year.....	56
Third year.....	22
Fourth year.....	18
Fifth year.....	14

Total..... 200

Home Economics—

First year.....	49
Second year.....	30
Third year.....	13
Fourth year.....	8
Fifth year.....	8

Total..... 108

SASKATCHEWAN COLLEGE OF AGRICULTURE

Associate Students—

First year.....	45
Second year.....	32
Third year.....	11

Total..... 88

Degree Students (B.S.A.)—

First year.....	23
Second year.....	23
Third year.....	10
Fourth year.....	9

Total..... 65

M.S.A. Students..... 2

ALBERTA COLLEGE OF AGRICULTURE

Combined Course in Arts and Agri- culture.....	8
Third year.....	21
Fourth year.....	10
Fifth year.....	10
Special courses.....	5

Total..... 54

ALBERTA SCHOOLS OF AGRICULTURE

	Boys.	Girls.
Youngstown.....	27	8
Gleichen.....	29	16
Raymond.....	45	35
Olds.....	84	46
Claresholm.....	70	20
Vermilion.....	18	17
Total.....	273	142

BRITISH COLUMBIA COLLEGE OF AGRICULTURE

First year.....	16
Second year.....	12
Third year.....	10
Fourth year.....	8

Total..... 46

PART III

Junior Agriculture

DEMONSTRATIONS, COMPETITIONS, AND CLASS-ROOM STUDIES IN RURAL
LIFE FOR BOYS AND GIRLS

SCHOOL FAIRS, 1920

NOVA SCOTIA

BY L. A. DEWOLFE, M.SC., DIRECTOR OF RURAL SCIENCE SCHOOLS

THIS year there was a falling off in the number of schools exhibiting at the county exhibitions and in the older established centres. This, however, was offset by the number of local fairs in new districts. For the whole province, therefore, the number of school fairs was practically the same as last year. Two hundred and forty schools exhibited at 135 separate fairs. There is a tendency towards the local one-school fair, rather than towards the district fair. Two reasons are given for this. One is the difficulty in getting exhibits transported to the central fair. The other is the fact that parents fail to see their children's exhibits unless exhibited in the home section.

There is not likely to be much change in the number of fairs from

year to year. Teachers govern such activities; and the number of trained teachers remains about the same. Older ones leave the profession as fast as a new supply is trained.

In addition to an annual change of teachers, another cause for a falling off of already established exhibition centres is the fact that children tire of the same thing year after year. We have proved this by the added interest taken in such innovations as sports and contests. There is the danger, however, of turning the exhibition into a mere holiday of sports. That, too, would be fatal so far as educational value is concerned. We are striving, therefore, to make our prize-lists as educative as possible; and at the same time to include enough sports to make the programme attractive.

NEW BRUNSWICK

BY A. C. GORHAM, M.SC., AGR., DIRECTOR OF ELEMENTARY AGRICULTURAL EDUCATION

SCCHOOL fairs held in New Brunswick were a decided success this year. These are organized by the Division of Elementary Agricultural Education with the co-operation of the teachers and trustees of the various districts.

The greatest degree of success was attained where the teachers organized

the pupils into committees to carry out the different activities in connection with the fair.

The exhibits at the fairs were composed of produce from the school garden, the home garden and the poultry project. This work is under the supervision of the teacher and a

supervisor sent out during the summer by the Division of Elementary Agricultural Education.

The seeds for the schools and home gardens were sent free to the schools making application for them. These seeds were produced on the home plots known as "Standard Plots" and of which there were about four thousand. Besides the seeds thus furnished, a large number of pupils furnished their own seed from home plots.

Settings of eggs were sent to schools in which a club had been formed and where the pupils and their parents agreed to carry out the rules and pay for the eggs. Payment for the eggs is expected to be made in October, wherever two or more chickens have been produced from a setting, or if failure is due to gross negligence on the part of the children.

The outstanding improvement in the school fairs this year was the ease with which they were carried to a successful issue by the teachers, the classification of exhibits, and the better selection of specimens. Each year the pupils' attention has been called to the exhibits winning prizes and explanations have been given as to why the prizes were placed where they were. It is of greatest importance that the pupil should know why

he obtained first, second or third prize, so that he may have a clear conception of the standard by which the exhibits are judged.

It is made a rule to require each exhibitor to sign a paper declaring that his exhibits were the result of his own work and care, under the direction and instruction given by the teacher.

HOME PLOTS

The home plots this year were as a rule very well kept throughout the summer. Few plots scored below seventy-five per cent and many scored over ninety per cent. It has been observed that the success of these home plots bears a direct relationship to the kind of instruction and demonstration given by the teachers to the pupils after receiving the seeds and directions for planting.

The consolidated school at Rothesay has a plan which gives good results. The garden plots and poultry projects in the district are visited and scored by the teachers before the end of the term, and a certain number of marks, according to the quality of the work done, are added to the pupil's standing in the school in nature study.

QUEBEC

MATANE COUNTY

BY JULES RINFRET, B.S.A., AGRICULTURAL REPRESENTATIVE

WITH a view to educating boys and girls, school and home gardens were established in Matane county. The programme of such work, includes a free distribution of seed grain, vegetable seeds and eggs from pure bred fowls. Seeds are distributed to all who apply, while eggs are drawn by lots by the

most deserving pupils. About seven hundred gardens were established in my district and fifty settings of eggs distributed. I called at every school to supply information to the pupils on the growing of crops and raising of chicks. After the inspection of the gardens was over, school fairs were organized in the fall. There were

three fairs, each attended by about one hundred and fifty pupils and at each of which the sum of \$60 was and private individuals. Among the many benefits that are derived from such fairs, one of the most important



A QUEBEC SCHOOL FAIR

distributed in prizes. Most of this money was composed of subscriptions from school boards, farmers' clubs

to my mind, is that they prepare exhibitors for the greater agricultural fairs.

RICHMOND COUNTY

BY A. PROULX, B.S.A., AGRICULTURAL REPRESENTATIVE

IN the County of Richmond six very successful school fairs were held this season. The products were usually of very fine quality and were grown principally from seeds distributed to the pupils of the schools by the Provincial Department of Agriculture. Fifteen thousand of the boys and girls in this county receive these seeds and it has been the duty of the agricultural representative to

visit the gardens in which the seeds were planted and to give necessary instruction to the gardeners. The work was greatly helped by the interest and the encouragement of the parents. It is intended to develop the school fair work in this county by encouraging the children to take more interest in live stock and to exhibit their animals properly presented at the annual school fairs.

ONTARIO

OXFORD COUNTY

BY G. R. GREEN, B.S.A., AGRICULTURAL REPRESENTATIVE

THE township school fairs held in Oxford county have been followed by a champion fair held in connection with the Agricultural Society Fair at Woodstock. At the latter exhibition the winners of 1st, 2nd, and 3rd prizes at each of the township fairs were eligible to compete.

The outstanding feature of the champion fair was the champion stock judging event, in which the teams winning first and second prize at each of the township fairs competed for the championship. Out of a possible twenty teams, fifteen were on hand for the event, and a lively competition was the result. The boys were given two classes of horses and two of dairy cattle to judge. The contest was under the direction of Mr. R. S. Duncan, Supervisor of Agricultural Representatives, of Toronto, and Mr. I. B. Whale, Assistant Editor of the Farmer's Advocate. The boys were given twenty minutes to place each class and write their reasons.

For the first time in this county a number of judging teams were

coached by young men who had taken short courses in agriculture in the county. As a reward for their services special prizes were awarded to the successful coaches. The special prizes were the Oxford County Championship Trophy, the Merchants Bank of Canada Special, and the Harris Abattoir Special. The Oxford County Championship Trophy consisted of a pure bred pig to be given to each boy on the winning team. The Merchants Bank of Canada Special was a free trip to the International Live Stock Show at Chicago, for the coach of the winning team. The Harris Abattoir Special consisted of two free trips to the same exhibition. What was termed the Toronto City Dairy Special consisted of a pure bred Holstein heifer to the boy who made the highest number of marks and whose father was a patron of the city dairy. For each boy on the team winning 2nd place 100 Barred Rock eggs were given, and to each boy on the team winning 3rd place 50 eggs of the same breed were awarded.

NORFOLK COUNTY

BY E. F. NEFF, B.S.A., AGRICULTURAL REPRESENTATIVE

THE school fairs this fall were all well attended and just as much interest was shown as ever before and in some cases more interest was taken by the children. Three of our fairs were held jointly with the fall fairs and three separately. At Waterford the Agricultural Society took in about \$150 gate receipts in excess of that taken last year and last year's were \$100 in excess of that of the previous year. The two fairs having been held jointly for

two years, this would indicate that the school fair is of considerable advantage financially at least to the fall fair.

The new system of keeping records was used at the fairs and we found it to work out perfectly, being able to give cheques to the teachers for the amount of the prize money, covering the winnings of their pupils within one-half hour or so of the time that the judging was completed and the tent or building opened. This saved

a good deal of clerical work in the office after the fairs were over.

With regard to the Championship Fair which was held in conjunction with the county Fall Fair at Simcoe, Oct. 4th, 5th and 6th, all pupils who had won a prize at the school fair were allowed to exhibit.

The prize money was paid from the funds of the Agricultural Society

and a part of one of the buildings was reserved for the exhibit. We arranged to do the judging and pay the prize money to the teachers of the schools who in turn presented the money to the pupils. We heard many favourable comments on the exhibits this year and as there were over 12,000 people who attended the county fair, there must have been 10,000 people who saw the exhibits.

HOME GARDEN CONTESTS

BRANT COUNTY

BY R. SCHYLER, B.S.A., AGRICULTURAL REPRESENTATIVE

TWO home garden competitions were held in Brant county this year, one for the boys and one for the girls, with twenty-three competitors in each division. The judging was all done during the early part of July, which is somewhat earlier than usual. The gardens on the whole were good, sixty per cent of them being unusually good. Most of the children take a great deal of interest in this work and very often the best part of the farm garden is the part worked by the child. It might be further improved by enlarging the garden so as to include

a more complete list of vegetables and sufficient to produce practically all the small vegetables the family would require. This would not necessitate two gardens as is often the case at present which prevents many taking part in the competition.

Seeds as follows were distributed last spring:—Beans, cabbage, tomatoes, sweet corn, peas, onions, spinach, radish, lettuce, parsnips, beets, and carrots. The distribution could well include salsify, cauliflower, early potatoes, cucumbers, citrons, celery, etc., which would make a fairly complete garden.

DUNDAS COUNTY

BY W. C. CALDWELL, B.S.A., AGRICULTURAL REPRESENTATIVE

IN Dundas county two home garden competitions were held with a little more than fifty contestants. Each territory covered three townships. While many of the individual gardens were superior to the farm garden on the same farm, the general success of the work was interfered with by the scarcity of labour. From this cause several competitors were compelled to discontinue while others were not able to keep their gardens up to the standard desired. At the school fair, prizes were offered for collections of vegetables from the home garden competition plot. At

the Winchester school fair a collection from the winning home garden won first award but was compelled to take third place at the Williamsburg school fair.

Home gardens were each scored but once during the summer. It would seem desirable that the scoring be done two or three times in order to keep up the interest of the competitors. The great value of the home garden competition lies in the fact that it holds the interest of the boys and girls in public school work even after they have left school.

MANITOBA

BOYS' AND GIRLS' CLUBS

BY S. T. NEWTON, DIRECTOR AGRICULTURAL EXTENSION

THE eighth annual series of Boys' and Girls' Club Fairs came to a close on October 8th, when several of the really big fairs, such as Portage la Prairie and Minnedosa were held. Altogether, there were 229 fairs, ranging in size from those produced by two-roomed schools to those taking in a whole municipality.

as potatoes, carrots, parsnips, beets, etc., received particular attention; and on this account a long list of prizes was provided in each class, as this insures the majority of the entries being placed, thus showing the exhibitor exactly where his exhibit stands in relation to the best exhibits. At Neepawa, for instance,



THE MORDEN CANNING TEAM

As in previous years, the club work was confined to a few well defined phases of agriculture and home-making, and even in these classes the field was considerably narrowed; for instance the live stock work was confined to pigs, calves, sheep and colts. In gardening such vegetables as require considerable skill to grow, such as celery, cauliflower, and cabbage, were not included, while such others

there were 75 exhibits of potatoes in one class, and there were 24 prizes.

To some considerable extent the Manitoba boys and girls have to compete with nature. Threshing operations usually continue until close to the "freeze up," and frequently there is from a week to ten days of wet weather at some period during the season when the fairs are being

held. The wet weather usually increases the attendance of adults, but lessens the number of exhibits, as the outlying districts find it difficult to transport exhibits like calves and pigs to the fair.

This year one-half of the fairs encountered wet weather and muddy roads, and the other half the most glorious kind of weather, when it was very difficult to coax the farmers away from the threshing. Nevertheless, the number of entries was larger and the attendance both of

records, 2,642; school work, 42,922; stock judging competitions, 117.

The fairs were arranged in circuits, according to inspectoral division, and the Department of Agriculture provided two judges for all the fairs, a man to judge the live stock, vegetables, etc., and a home economics expert for the girls' work. The school inspector usually judged the school work. Much valuable assistance was given in judging at the fairs by the members of the



THE MEDORA DYEING TEAM

parents and of children greater than any previous year.

Statistics for the Manitoba fairs are as follows:—

Number of fairs, 229; attendance: adults, 24,927; children 22,607; number of exhibitors, 21,000; number of exhibits: calves, 906; pigs, 755; sheep, 377; colts, 309; poultry, 3,381; dairy, 580; grain, 1,907; gardening, 14,455; cookery, 11,404; sewing, 10,521; canning, 4,611; noxious weeds, 1,641; farm mechanics, 1,469;

Agricultural College staff, particularly the Home Economics section, each member of which judged at from 10 to 15 fairs. Several of the other judges were members of the fifth year class in Home Economics at the College, and still others were graduates in the same division. These graduates, though they now have homes of their own, take a keen interest in the Boys' and Girls' Clubs, and plan to take a couple of weeks to assist in judging at the fairs.

In a previous article in *The Gazette* mention was made of the demonstration teams. This proved to be one of the real "hits" in Boys' and Girls' Club Work this year. The 66 champion demonstrators in the Girls' Division were given their trip to Winnipeg during the first week in September, when they competed for provincial honours at the Winnipeg Horticultural Show. The demonstrations proved to be one of the big attractions of the show, and there were always a couple of hundred interested spectators when one of the demonstrations was in progress.

In addition to giving their demonstrations at the Horticultural Show, two of the teams were invited to put on their demonstration at the

Normal School and ten of the teams at the T. Eaton Company's store.

Cow testing, canning and garment dyeing were the subjects of the demonstrations, but next year all phases of club work will be invested with a degree of interest that will raise them above the commonplaces in life and show that all lines of farm work have a real interest if pursued in the right spirit.

It will enable the schools to spread the interest in club work throughout the whole year, instead of having it end in a spurt at the end of the season, possibly on a wet day.

Below is given the score card and scores of the five highest scoring teams.

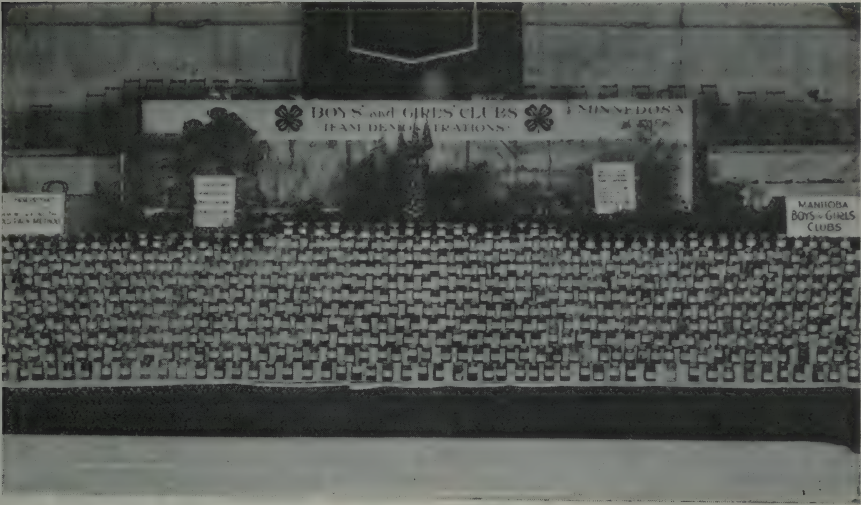
	Skill	Subject Matter	Team Work	Product	Total	
	20	20	40	20	100	
MEDORA—						
1. Jean King.....	18½	19½	37½	18	93½	
2. Isabel Gervin...	18½	19½	37½	18	93½	
3. Gertie Fallas...	18½	19½	37½	18	93	282
MINNEDOSA—						
1. Lily Beddome..	15½	19	24½	16	85	
2. Irene Beddome..	17½	19½	38	16	91	
3. Jean Rorke.....	15½	16	33	16	81	248
MORDEN—						
1. Ruby Rabino- vitch.....	17½	18	35	15	85½	
2. Kathleen Finn..	16½	19	36	15	86½	
3. Nancy Alleyn...	17½	19	35	15	86½	259
MIAMI—						
1. Enid Garnet....	16	17	33	14	80	
2. Isabella Alex- ander.....	17	17	34	14	82	
3. Muriel Patteson.	18	17	34	14	83	245
HAMIOTA—						
1. Florence Fraser.	15½	17	32	15	79½	
2. Molly Thring...	15½	18	34½	15	84	
3. Alice Lindsay...	15½	16	32	15	78½	243

The champion teams in stock and vegetable judging, pig and calf raising and general proficiency will be given their trip to Winnipeg later, when the farm work is not so pressing, and they can be more easily spared for a week.

Demonstration team work as a part of the Manitoba Boys' and Girls' Club programme is here to stay, because it gives those who take part in it splendid practice in organization, co-operation, public speaking, and the ability to pass on to others

the inspiration and enthusiasm for project work which they themselves have enjoyed.

these occasions team demonstration work will be featured, as already the three high scoring teams have several engagements to fill, at the head-



JARS OF FRUIT AND VEGETABLES CANNED BY TWENTY DEMONSTRATION TEAMS

During the next month many achievement day programs will be presented, when the prizes won at the fairs will be distributed, and on

quarters of other teams, and, better still, each member is planning how she may act as team leader and train a team of her own on an entirely new subject for next year.

INTERCOLLEGIATE STOCK JUDGING

IN the judging contest between teams of students representing Agricultural Colleges held at the International Live Stock Show at Chicago, the three Canadian colleges competing stood eleventh, twelfth and thirteenth. The winning team from Purdue University of Indiana secured a score of three thousand seven hundred and ninety-six out of a possible six thousand. The three Canadian Colleges made

the following scores:—Macdonald College, three thousand four hundred and six; Saskatchewan, three thousand three hundred and eighty-four; and Ontario three thousand three hundred and forty-nine. In a long list of individual competitors W. S. Benson of Saskatchewan won sixth position with a score of seven hundred and sixty-nine against eight hundred and thirty-one won by the highest man.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications, and Notes

MEETINGS AND SHOWS

December 1st and 2nd. The Annual Convention of the Dairymen's Association of the Province of Quebec, at Ste-Scholastique. Secretary, Alexandre Dion, Quebec.

December 1st and 2nd. The annual meeting of the Pomological and Fruit Growing Society of the Province of Quebec, at Macdonald College. Secretary, Peter Reid, Chateauguay Basin, Que.

December 2nd and 3rd. The second annual meeting and Dairy Show of the New Brunswick Dairymen United, at Sussex. Secretary, George Thimens, Sussex.

December 3rd to 9th. The Ontario Provincial Winter Fair, Guelph. Secretary, J. E. Rettie, Toronto.

December 9th and 10th. The annual meeting of the Canadian Creamerymen's Association in the Carls-Rite Hotel, Toronto. Secretary, H. S. Johnston, Lindsay, Ont.

December 13th, 14th, 15th and 16th. The Annual Winter Fair, Amherst, N.S. Secretary-Manager, F. L. Fuller, Truro, N.S.

December 14th. The annual shareholders meeting of the United Farmers' Co-operative Company. Secretary, J. J. Morrison, Toronto.

December 15th, 16th and 17th. The annual convention of the United Farmers of Ontario. Secretary, J. J. Morrison, Toronto.

December 15th and 16th. The annual meeting of the Western Canada Live Stock Union, Calgary, Alberta. Secretary, E. L. Richardson, Calgary.

January 9, 1921. The annual meeting of the Province of Quebec Society for the Protection of Birds will be held in the Windsor Hotel, Montreal. The Secretary is Mrs. W. E. L. Dyer, Montreal.

January 11 and 12, 1921. The annual meeting of the Agricultural and Experimental Union of Ontario, at the Ontario Agricultural College, Guelph, Secretary, C. A. Zavitz, Guelph.

January 12, 13 and 14. The annual convention of the United Farmers of Manitoba. Secretary, Wm. R. Wood, Winnipeg, Man.

January 18 and 19, 1921. Annual meeting of the Agricultural Societies Convention. Secretary S. T. Newton, Department of Agriculture, Winnipeg, Man.

January 18, 1921. The annual meeting of the Prince Edward Island Dairymen's Association. Secretary, J. F. Profitt, Kensington, P.E.I.

January 19 and 20, 1921. The annual convention of the Dairymen's Association at Nova Scotia. Secretary, W. A. MacKay, Truro, N.S.

January 20, 1921. The annual meeting of the Manitoba Branch of the Canadian Association in Winnipeg. Secretary, J. H. Kiteley, Department of Agriculture, Winnipeg, Man.

January 21, 1921. Manitoba Bee Keepers' Association Convention in Winnipeg. Secretary, J. H. Kiteley, Department of Agriculture, Winnipeg, Man.

ASSOCIATIONS AND SOCIETIES

NEW BRUNSWICK WOMEN'S INSTITUTES

The eighth annual convention of the New Brunswick Women's Institutes was held at Moncton on October 12th and 13th. In addition to the usual programme, the convention was addressed by Judge Murphy of Edmonton, President of the Federated Women's Institutes. The following officers of the advisory board were elected: President, Mrs. Osman, Hillsboro; Vice-President, Mrs.

John Harvey, Fredericton; Secy.-Treasurer, Miss Stella Langis, Tracadie. Resolutions were adopted urging an early Dominion referendum on the liquor question; urging the better safe-guarding of children; and recommending that the Institutes send the names of blind or nearly blind in their respective localities to the branch of the National Institution for the Blind at Halifax.

THE CANADIAN SOCIETY OF TECHNICAL AGRICULTURISTS

BY FRED. H. GRINDLAY, GENERAL SECRETARY-TREASURER

Since the organizing convention, which was held in Ottawa last June, substantial progress has been made by the Canadian Society of Technical Agriculturists. It was early felt that the future success of the organization depended upon publicity, and for that reason the establishment of an "official organ" was deemed imperative. Without some such channel through which the activities of the Society could be disseminated, many of its objects could never be accomplished.

Arrangements have now been completed for the publication of "Scientific Agriculture," a monthly magazine of a technical nature, the first issue of which will appear in January next. Its editor will be the General Secretary of the Society.

As a consultative body, there will be an Editorial Board. A tentative board is now being appointed by the Dominion executive. This board will be composed of two recognized experts in each of the main fields of agriculture: animal husbandry, bacteriology, botany, cereal husbandry, chemistry, dairying, entomology, genetics, horticulture and veterinary science. Possibly the divisions

of rural engineering, rural economy and rural sociology will be included in this board, which will be appointed hereafter at each annual convention of the Society.

Progress has also been made in the matter of provincial organization. The secretary in co-operation with provincial officials has completed organization work in Eastern Canada and left for the western provinces early in December. Without doubt these local branches will do much to sustain interest and enthusiasm among the members, and in most cases very interesting winter programmes have been arranged.

The membership of the Society, which was four hundred and eleven at the close of the convention has increased to four hundred and sixty.

The complete report of the addresses and discussions at the organizing convention will be available for members of the Society early in December.

Early in the year it will be necessary to proceed with plans leading up to the next annual convention, which is to be held at Winnipeg in June next.

THE FEDERATED WOMEN'S INSTITUTES OF CANADA

At a meeting of the board of directors of the Federated Women's Institutes of Canada, held recently in Montreal, a set of recommendations for educational propaganda in women's institutes was introduced.

1. That a group of workers selected from the different provinces be trained in the principles and practices of Women's Institutes, who will form this section and be prepared to carry out plans of work.

2. That schools of instruction be held in each province.

3. That text books and leaflets relating to methods of work be prepared and made available for Institute workers.

4. That this section can be made a clearing-house for new ideas and improvements which have been tested in the Institutes.

5. That journals which have a W. I. department include a department of W. I.

Technique, mainly for questions and answers.

6. That it may be recommended to the provinces that conference programmes include always items relating to Institute methods of work, with ample time allowed for after discussion.

7. That it be suggested to the Institutes that their yearly programme contain from time to time similar items.

8. That it be suggested to the Institutes that their annual meeting being the business meeting of the year, could well be a model meeting illustrating W. I. procedure and conduct of business.

9. That educational institutions which have a department of agriculture be asked to inaugurate a short course in Woman's Place in Rural Economy, with special reference to Women's Institute work.

ASSOCIATION OF AGRICULTURAL MISSIONARIES

The twenty-fourth annual convention of the Association of Agricultural Missionaries of the Province of Quebec was held at Riviere du Loup. This association is twenty-five years old. It was formed by the bishops of the province, by request of the Minister

of Agriculture. It has a two-fold object: educate the farmer, i.e., keep him informed of all latest developments in agriculture, and instil a love for the land among the farmers' sons in order to check the general exodus from the farm to the city.

The following lectures were given at the convention. "The Patriotic Side of Farming," by M. C. Gauvreau; "The Association and its Objects," by Rev. Ad. Michaud; "La Caisse Populaire," by Rev. Philibert Grondin; "Co-operative Organizations," by Rev. J. B. Allaire; "Agricultural Missionaries in Quebec," by J. C. Chapais; "Dairying and

Cow Testing," by J. B. Trudel; "Hygiene," by Dr. Parrot; "Fodder Crops," by Leo. Brown. Mr. Grenier, Deputy Minister of Agriculture for Quebec, gave an outline of the work undertaken by the Department of Agriculture and showed in what way agricultural missionaries can help the department.

NEW PUBLICATIONS

DOMINION DEPARTMENT OF AGRICULTURE

Report of the Minister of Agriculture. The Report of the Minister of Agriculture of Canada for the year ending March 31, 1920, contains a list of the legislations and orders in council effecting the department during the year, and a review of the work of each of the nine branches. An appendix gives a different line of the conference of representatives of federal and provincial departments of Agriculture held at Ottawa in March.

THE DAIRY AND COLD STORAGE BRANCH

Simple Methods for the Storage of Ice.—Bulletin No. 57 of the Dairy and Cold Storage Commissioner's Series gives plans and descriptions of icehouses for the ordinary storage of ice, with specifications for an insulated ice house and for an ice well.

The Oleomargarine Act, Circular No. 29, of the Dairy and Cold Storage Commissioner's Series consists of "The Oleomargarine Act of 1919" as amended with its regulations.

LIVE STOCK BRANCH

Report of the Canadian Record of Performance. Report No. 12 of the Canadian Record of Performance for pure bred dairy cattle issued by the Live Stock Branch, contains the records of the animals of the different breeds that qualified for registration in the year ending March 31, 1920, it also contains the resolutions, regulations and standards for registration.

EXPERIMENTAL FARMS

Bush Fruits, Bulletin No. 94 of the Experimental Farms, constitutes a treatise by Mr. W. T. Macoun, Dominion Horticulturist, and Mr. M. B. Davis, Assistant in Pomology, on the subject of bush fruits and their cultivation in Canada. The bulletin also contains a contribution from the Entomological Branch on insects affecting bush fruits, and one from the Division of Botany on the common diseases affecting these plants.

Wintering Bees in Canada. In bulletin No. 43, second series of the Experimental Farms, Mr. F. W. L. Sladen, Dominion Apiarist, discusses the protection of bees during the winter. Both inside and outside wintering, as well as spring management, are dealt with.

NEW BRUNSWICK

Poultry Culling.—Bulletin No. 38 by A. C. McCullough, poultry Superintendent, explains the culling of poultry for egg production and describes the method of doing the work.

QUEBEC

Heredity and Genetics. In the form of expanded notes of a course of lectures given by Mr. William Lochhead, Professor of Biology at Macdonald College, a text-book has been issued on the subject of plant and animal breeding. The book is entitled "An introduction to Heredity and Genetics," and is prepared from the biological standpoint for the student who desires to specialize in animal husbandry, cereal husbandry, or horticulture.

ONTARIO

Stallion Enrolment Board. The report of the Stallion Enrolment Board for 1920 shows that 1,683 stallions were enrolled this year. The report shows the enrolment by counties and recommends changes in the stallion law; gives a list of the horses which have received premium certificates for 1920 and those that received cash premium for 1919.

Report of Statistics Branch. The annual report of the statistics branch for 1919 contains in part I statistics in relation to the agricultural industry in the province, and in part II a list of the chattel mortgages by counties and municipalities on record and undischarged on December 31, 1919.

Report of Women's Institutes. The annual report of the work of Women's Institutes of Ontario for the year 1919 includes the proceedings of the annual conventions for eastern, central, and western Ontario, and the statistical report for 1918-19, as well as reports of a number of representative institutes.

MANITOBA

Manitoba Dairy Association. Addresses delivered at the annual convention of the Manitoba Dairy Association held in February, 1920, are contained in this report.

ALBERTA

Annual Report of the Department of Agriculture of the Province of Alberta, 1919, contains a summary of the agricultural conditions in the provinces, as well as reports from the heads of the various branches dealing with their work for the year.

BRITISH COLUMBIA

Proceedings of the Entomological Society. No. 11 of the Economic Series of the Entomological Society of British Columbia contains six papers on insect pests and control presented at the meeting of the society held in April, 1920. The principal insects treated are the onion maggot, the tent caterpillar, and cut worms. There is also contained a

general record of work carried on in Canada and the United States.

Department of Agriculture Report. The fourteenth annual report of the Department of Agriculture gives the organization of the department, the official staff employed, the conditions in the province, and the work accomplished by the department in 1919.

Report of the Veterinary Association.—The annual report of the British Columbia Veterinary Association, contains an account of the annual meeting held at New Westminster on September 28th, 1920. The secretary of the association is Kenneth Chester.

MISCELLANEOUS

Fruit Statistics of Canada, 1919, is the title of a pamphlet reprinted from the monthly bulletin of agricultural statistics for August and distributed by the Canadian Bureau of Statistics, Ottawa. The statistics given are those of production in quantities and value of fruit grown in Canada in 1919 and the trade in fruit that year.

NOTES

Mr. Alphonse Desjardins, founder of the rural credit banking system, known in Quebec as La Caisse Populaire, died at his home at Levis, Quebec, on October 31.

The poultry department of the University of British Columbia has entered some four hundred birds in the Record of Performance Egg Laying Contest.

The Saskatchewan Department of Agriculture has imported two high class Clydesdale Stallion colts that will be placed at the disposal of Clydesdale horse breeders in the province.

The stock yards at Moose Jaw that have been operated by the Canadian Pacific Railway Company as feed yards have been taken over by the Southern Saskatchewan Co-operative Stock Yards, Ltd.

Mr. C. H. Hodge, agricultural representative in Pontiac County, Quebec, has left the provincial service and joined the staff of the Family Herald and Weekly Star in Montreal.

In a campaign for the improvement of the sheep breeding industry in the county of Beauce, Quebec, conducted through the office of the agricultural representative, one hundred and fifty farmers have purchased pure-bred rams of suitable breed.

Mr. A. J. Logsdaile, formerly plant hybridist in the horticultural division of the Experimental Farm and now a fruit farmer at St. Catharines, Ont., has been engaged by the Ontario Department of Agriculture to give a course of lectures at the Kemptville Agricultural School during the winter season.

Mr. J. L. Dougherty, Agricultural Representative in Kent County, has advised THE GAZETTE that the tobacco growers in that county have organized a Co-operative Business Association and are installing a drying plant at Kingsville. It is their intention to instal driers at Chatham and other points as conditions warrant.

Le Comptoir Co-operatif de Montreal, which handles very large quantities of produce for Quebec farmers, claims in their annual report to have avoided the pitfalls that have overtaken many co-operative concerns by studying the series on "Why Co-operation Fails" that appeared in THE AGRICULTURAL GAZETTE for October last year.

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PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to
T. K. Doherty, International Institute Commissioner, Department of
Agriculture, West Block, Ottawa.

SCIENCE AND PRACTICE OF AGRICULTURE

CROPS AND CULTIVATION

Periodicity in Weather and Crops.—Nature, No. 2638, pp. 370-371. London, 1920.

Brief reference is made to a lecture by Sir William Beveridge, director of the London School of Economics and Political Science, on what he claims to be a hitherto unrecognized periodicity in the weather and crops. On the basis of historic records of poor harvests, Indian famines, tropical droughts, and disastrous wet summers in higher latitudes, and also to a great extent upon official statistics of food prices, the author endeavours to establish a weather period of $15\frac{1}{2}$ years during the past three centuries. He predicts unseasonable weather, bad harvests, and high prices, with possible famines in one or more of the years 1924, 1925, and 1926.

Soil Making.—RUSSELL, E. J., in *Journal of the Royal Horticultural Society*, Vol. 44, pp. 1-12. London, 1919.

The origin, composition, and treatment of normal agricultural soils are discussed, the general conclusion being drawn that the making of soil requires proper mineral matter, organic matter, and conditions suitable for the decomposition of the organic matter.

Soil Reaction.—DEMOLON, A., in *La Revue scientifique*, Vol. 58, No. 6, pp. 173-177. Paris, 1920.

This is a review of literature on the cause, nature and determination of soil acidity, taking up both chemical and physical methods of determination and calling particular attention to the bacteriological method of studying soil acidity by means of the presence of azotobacter. Works on the influence of acidity on fertilizers and vegetation and the correction of acidity by liming are also reviewed.

Maintenance of Pastures and Meadows.—STOKEY, E. B., *West. Washington Station Monthly Bulletin* Vol. 8, No. 3, pp. 36-39, Pullman, Wash., 1920.

The mowing, cultivation, reseeding, fertilization, and use of pastures and meadows is briefly discussed, and the annual results secured from 1913-1919 on an experiment field sown with grasses and clovers are noted. The field at the close of the period was practically free from moss, and had very few weeds and a very good stand of grasses and clovers, which made satisfactory growth. The plants proving specially valuable and persistent were Italian rye grass, orchard grass, tall oat grass, Kentucky blue grass, redbud, meadow fescue, white clover, alsike clover, and red clover.

Nitrogen Economy in the Soil as Influenced by Various Crops Grown Under Control Conditions.—WRIGHT, R. C., in *Soil Science*, Vol. 10, No. 4, pp. 249-289. Washington, D.C.

During recent years and especially under present conditions, the high price of fertilizer constituents has necessitated in some cases other means of maintaining the fertility of the soil than by applying the customary amounts of commercial fertilizer. The constituent that this paper has to deal with, viz., nitrogen, has become quite expensive; consequently more and more attention is devoted to efforts to maintain the nitrogen supply in the soil through various cultural practices.

One practice, which is a very ancient one, is the growing of various leguminous crops as green manure to be ploughed under. That leguminous crops when ploughed under always add nitrogen to the soil in excess of that removed by the crop in its growth has apparently seldom been questioned. Likewise, it apparently has generally been taken for granted that a non-leguminous green manure, when turned

under, always returns to the soil all the nitrogen that has been removed during its growth.

A series of pot experiments were started by the author at Arlington Farm of the United States Department of Agriculture in 1914. The object in view was to make a comparative study of the amount of nitrogen removed from the soil by representative leguminous and non-leguminous crops grown under control conditions, and of the amount of nitrogen recovered in these crops themselves.

The author concludes that under the conditions of frequent handling with consequent thorough aeration of the experimental soils, cultivation or excessive aeration of a soil causes a loss of total nitrogen.

Under certain crops there is an absolute loss of nitrogen in excess of that recovered in the crops;

This varies with different crops and different soils;

This loss occurs under certain legumes as well as non-legumes;

When there is nitrogen fixation with the growth of certain legumes—that is, when there is recovered more than was taken from the soil—this nitrogen is found in the crop above the ground and if this is removed, the soil will have been depleted just as if a non-leguminous crop had been grown and removed;

It is recognized that these results are not directly applicable to field conditions. It is not improbable, however, that the changes found to occur under the experimental conditions indicate relatively similar, although perhaps much less marked, changes in the nitrogen content of the field soils when different crops are grown.

A Field Comparison of Hydrated Lime With Limestone of Different Degrees of Refinement.—HARTWELL, B. L., and DAMON, S. C., in *Rhode Island Agricultural Experiment Station Bulletin* 180, pp. 18. Kingston, R.I., 1919.

During the year of application, 80-mesh limestone had the same effect as an equivalent amount of hydrated lime; and the percentage of this grade in the 10-mesh limestone represented approximately the first season's efficiency of the calcium oxide equivalent in the limestone as compared with that in hydrated lime. During the 5 years following the single application, the average results were slightly in favour of the hydrated lime—Four crops were grown in each of 5 years on the same plot sections to ascertain their cumulative effect on a single crop of barley grown over the entire area in the field, and on lettuce grown in pots. Arranged in a decreasing series, the order of the crops was the same in accordance with their need for lime, and also their cumulative effect in enhancing acid-soil conditions.

The order is as follows: mangels, carrots, alfalfa, and barley. Where the acidity was reduced by liming, the four crops affected a succeeding crop about uniformly.

Ammonium Nitrate.—MALPEAUX, L., in *Vie agricole et rurale*, Vol. 9, No. 17, pp. 294-296. Paris, 1920.

The author briefly reviews the results of work by himself and others on the use of ammonium nitrate as a fertilizer, and draws conclusions as to its practical use.

His experience demonstrated that the nitrate nitrogen of ammonium nitrate is as effective as that of sodium nitrate, and its ammoniacal nitrogen is as effective as that of ammonium sulphate. With certain crops, such as beets, it was found that the use of ammonium nitrate gave results similar to those obtained when using a mixture of sodium nitrate and ammonium sulphate. Ammonium nitrate has a regular and sufficiently prolonged action on crops, and possesses the advantage of introducing no sodium into the soil. It is noted that the proper use of ammonium nitrate varies with the crop and the soil.

Radioactive Fertilizers. LAMPROY, E., in *Revue horticole*, Vol. 91, pp. 393-394. Paris, December, 1919.

Experiments with this type of fertilizer were conducted on beans, wheat, spring vetch, white pea, flax, potato, beet, Jerusalem artichoke and sunflower. The effects of the radioactive substances upon the cereals were more pronounced when they were combined with superphosphates, and the larger returns were generally obtained when they were used in connection with complete fertilizers. Approximately 45-50 pounds were applied to each acre. The influence of the radioactive materials was especially noticeable upon plants producing tubers or thick roots, particularly regarding sugar content. These fertilizers are worthy of trial for use with specific horticultural crops.

Conservation of Liquid Manure.—GERLACH, in *Mitteilungen der Deutschen Landw. Gesellschaft*, Vol. 23, No. 31. Berlin, 1919.

Experiments on the conservation of liquid manure with peat litter, potash salts, gypsum, formalin, sodium sulphate, and superphosphate are reported.

The use of peat litter for this purpose was found to be especially desirable where the litter is cheap. Potash salts, when added to the extent of 10 per cent decreased the nitrogen loss from 64 to 67 per cent. Kainit gave the best results. Finely ground gypsum reduced the nitrogen loss from 53 to 63 per cent. The addition of 0.75 per cent of formalin, containing 30 per cent formaldehyde, to fresh liquid manure was sufficient

to prevent the formation of gaseous nitrogenous compounds. When the acid-reacting salts, sodium bisulphate and superphosphate, were added to liquid manure in amounts sufficient to impart a permanent slightly acid reaction there was little or no loss of nitrogen. Owing to its general use as a fertilizer, superphosphate is considered the best material for this purpose.

Barley Fertilizer Experiments.—LEMMERMANN O., in *Wochenschrift für Brauerei*, Vol. 36, No. 48, pp. 355-358. Berlin, 1919.

Experiments on the action of different fertilizers and soil amendments and on the influence of the cultural condition of soil on barley are reported.

Studies of the relative fertilizing values of different nitrogenous fertilizers for barley, including ammonium chlorid, sodium-ammonium nitrate, lime nitrogen, urea, guanul, sodium nitrate, and ammonium sulphate, are first reported. The results showed that the nitrate forms of fertilizer were the most effective. Urea, however, gave marked results, but guanul and lime nitrogen had little effect, the former being used at a small loss. The ammonium fertilizers also were not very effective. Better results can be obtained with ammonium fertilizers by mixing them deeply with the soil. Further studies with sodium nitrate and ammonium fertilizers indicated that their effectiveness increased with the size of application up to 80 lbs. per acre.

Experiments with barley soils which had not been fertilized with phosphate for ten years showed no effect from applications of stable manure. Similar results were obtained with potash fertilization, and it was noted that there was no difference between the action of raw salts and that of high-grade salts. Further experiments with kainit and potassium chlorid showed that better results were obtained on barley with spring applications. The lime-magnesia ratio in soils was found not to be an important factor in large-scale barley growing.

Fertilizer Experiments With Potatoes.—

JENKINS, E. H., and CLINTON, G. P., in *Connecticut Agricultural Experiment Station Bulletin* 214, pp. 421-422. New Haven, 1920.

This is a series of observations on the yields of potatoes as affected by different fertilizers, especially potash. A 4-8-4 and a 2-9-4 each on duplicate plots gave rather uniform yields in 1917. The addition of 1,000 pounds wood ashes to the Essex 4-10-0 fertilizer increased the yield somewhat in one case, but was without effect in another. The addition of 2,000 pounds wood ashes to the same fertilizer increased the yield somewhat in the first case and in a more pronounced degree in the second. The ashes

induced scab. The 4-10-0 fertilizer in 1917 gave as good results as 4-8-4 when each was applied at the rate of 1,000 pounds per acre. In 1918 on other land a 3-8-3 formula in comparison with a 4-10-0 formula each applied at the rate of 1,800 pounds—800 pounds before the first harrowing, 400 pounds in the planter and 600 pounds at the second cultivation—gave 50 bushels the greater yield for the potash.

Review of Weed Legislation in Foreign Countries.—KUNGL. LANDTBR. AKADEMIEN. *Handlingar och Tidskrift*, Vol. 58, pp. 166-174. Stockholm, 1919.

Summary of laws affecting weeds and weed control in. European countries, United States, Canada, and Australia.

Supply of Inorganic Nitrogen in the United States.—GAILLARD, D. P., in *Chemical and Metallurgical Engineering*, Vol. 22, No. 18, pp. 841-845. New York, 1920.

A chart is given showing the actual supply and consumption of inorganic nitrogen for each year since 1900 and the estimated supply and consumption for each year to 1930. The chart shows how the expansion of nitrogen supply for coke ovens and gas works, even though abnormally stimulated by the war demand, will not furnish in the future half of the nitrogen used in this country, and unless this source of supply is supplemented as soon as possible by the operation of the Government fixed-nitrogen plants, and further supplemented by such development of the private fixed-nitrogen industry that there may be, the United States will be even more dependent on imported nitrogen 10 years from now than it is at present. Not only will the country be less well prepared from a military point of view, but the American consumers, which include directly a very large proportion of the farmers of the United States as well as many of the most fundamental chemical industries and indirectly the greater part of the population, will find it harder than ever to get an adequate supply of nitrogen at a cost within reason.

The Influence of Chlorides on the Growth of Certain Agricultural Plants.—I. TOTTINGHAM, W. E., A Preliminary Study of

the Influence of Chlorides on the Growth of Certain Agricultural Plants, in *Journal of the American Society of Agronomy*, Vol. XI, No. 1, pp. 1-32, Bibliography of of 81 publications. Lancaster, Pa., January 15, 1919.—II. HENDRY, G. W., Relative Effect of Sodium Chloride on the Development of Certain Legumes, *Ibid.* Vol. X, No. 6, pp. 246-249. September, 1918.

I. A preliminary study of the influence of chlorides on the growth of certain agricultural plants. A survey of the scientific

literature dealing with the physiological part played in the plant organism by chlorine shows that the various investigators hold very different opinions. While some consider chlorine to be indispensable to the plants' nutrition, others regard it as useful, but not essential. Further previous field and greenhouse experiments have proved that the effects of chlorides upon plants are extremely variable, and depend to a large extent upon the species, the type of soil, and the complex of factors considered as climate. The chlorides of the different alkaline metals are not equally efficacious, but according to Plate, may be classed in the following descending order:—Chlorides of sodium, potassium, rubidium, lithium, and caesium. The writer has studied the effect of the chlorides of sodium and potassium upon different plants growing in Knop's solution in the greenhouse and, in certain cases, in the field.

The introduction of potassium and sodium chlorides into water cultures but slightly affected wheat plants (*Triticum sativum*) during the first five weeks after germination. Buckwheat (*Polygonum Fagopyrum*), on the other hand, was decidedly affected by the addition of these chlorides. Although the seed production remained apparently undisturbed, the length of roots, and the yield of dry matter were reduced. The radish (*Raphanus sativus*) in soil cultures in the greenhouse responded only slightly to the application of potassium and sodium chlorides together with a complete fertilizer. Under the same conditions, these chlorides had a favourable effect upon the carrot (*Daucus Carota*) increasing the yield of dry matter and the percentage of sugars; the reverse, however, was found to occur in the case of the parsnip (*Pastinaca sativa*).

The sugar-beet (*Beta vulgaris*) gave the same general responses to chlorides as did the carrot when grown in the greenhouse. The chlorides greatly increased the yield in dry matter and the glucose content of the roots. Similar results were obtained from the application of common salt alone to beets grown in the field.

The potato (*Solanum tuberosum*) produced increased yields of dry matter in the tuber, when potassium chloride was applied in place of potassium sulphate. As regards the percentage of starch, different varieties of potato responded differently; in some it was decreased, while in others it remained unaffected. The results indicated that the variety of plant was more important than the type of soil in determining this effect of the chlorides. In field crops, sometimes the chlorides produced a decrease in the dry matter of the tubers without altering their quality (Triumph variety), while at others, no noticeable change was effected (Rural New Yorker). Sodium chloride applied alone altered the composition of the tubers but slightly, though it affected their quality seriously.

Proceeding from the observed effects of chlorides upon diastase and other enzymes which act upon carbohydrates, the writer advances the tentative hypothesis, that the varied physiological responses of different kinds and varieties of plants to chlorides may be due to the regulation of enzyme activity by these salts.

On the whole, it appears quite possible, that further investigation may lead to the development of practical rules for the use of chlorides in agriculture, due account being taken of those crops injured by these compounds, and of climatic and soil conditions.

II. *Relative effect of sodium chloride on the development of certain legumes.*—The visible effects exercised upon the plants by sodium chloride were as follows: (1) retarded germination; (2) retarded growth in height; (3) reduction in number of leaves; (4) reduction in dimension of leaves; (5) delay in flowering; (6) reduction in number of root nodules; (7) reduction in size of nodules; (8) premature death.

Of all the varieties used in these experiments the Lima Bean (*Phaseolus lunatus*) and the white tepary (*P. acutifolius* var. *latifolius* Freeman), were the most affected by the application of sodium chloride. The bean (*Vicia Faba*), the black eye cowpea (*Vigna sinensis*) and the chickpea (*Cicer arietinum*), were less affected by sodium chloride than any of the other plants, which included in addition to those already mentioned, the following different varieties of beans:—"cranberry," "small white," "red kidney," "Lady Washington," "pink," "red Mexican," "bayo," "blue pod."

Inoculation of Legumes With Nitragin.—*Revista de la Asociacion rural del Uruguay*, Vol. 48, No. 12, pp. 781-784. Montevideo, 1919.

This report summarizes the works of others bearing on the subject and deals with experience which indicates that nitragin is not applicable to all soils, especially those in poor tilth and those rich in nitrogen. It is concluded that the proper soil conditions under which nitragin may be effectively used are poverty in nitrogen, sufficiency of other fertility constituents, and moisture, and the soil neither acid nor excessively alkaline.

Line Selection Work With Potatoes.—WHIPPLE, O. B., in *Journal of Agricultural Research*, Vol. 19, No. 11, pp. 543-573. Washington, D.C., 1920.

The data and discussions presented in this article have to do with the subject of potato seed improvement through tuber selection. As such it deals with the improvement of existing varieties and not with the origin of new varieties.

After a detailed account of experiments with different varieties the author concludes that the data presented do not furnish very strong

evidence of the presence of high-yielding lines within the common population of the varieties studied. The real test of the existence of such lines is ability to maintain a high-yielding progeny by indiscriminate mass selection.

Short performance records are fairly reliable in eliminating lines with low-yielding tendencies, but they are not so reliable as a basis upon which to select plus variations if such really exist. If degenerate tendencies exist within certain clonal lines and not in others, short performance records are of little value in eliminating the undesirable lines.

Degenerate individuals appear with such persistent regularity within line selections as to become a real stumbling block. If there are no exceptions to this rule, before a hill or tuber line can be increased to a point where it is of real value in commercial potato production it is almost certain to contain degenerate types which soon reduce its yielding power to that of the common population of the variety.

The data presented will not justify an endorsement of the plan of clonal line selection as a practical method of potato-seed improvement. This does not mean that the hill-selection method of choosing potato seed is without merit. Generally speaking, high-yielding hills selected upon production by weight will produce the following season a high-yielding progeny. It does mean, however, that to be effective, hill selection becomes an annual task. The author believes there is a more practical method of potato-seed improvement.

Since certain vine characteristics are so closely correlated with yields, selection based on vine development alone promises to be more reliable than selection based on tuber production either by weight or number, and much more practical.

At present, selection based chiefly on vine characteristics seems to be the only hope in dealing with degeneration. The success of such selection is measured by one's ability to identify intermediate types as well as typical curly-dwarf degenerates.

A special seed plot in which the seed pieces from each tuber are planted in consecutive hills promises to afford the best solution of the problems of degeneration and the maintenance of high-yielding variety populations.

In his conclusions the author describes the methods of selecting seed for such a special seed plot as well as the methods of preparing and planting the seed and of cultivation. Roguing the seed plot is the most important step in the production of good seed. This consists in going over the field several times during the season and removing undesirable hills.

In many instances the improvement secured by growing a variety in a special

seed plot of this kind for one season may be apparent for two or three years after returning to the practice of selecting seed at random from the field at digging time or from the bin; but permanent improvement can be maintained only by continuing the special seed plot year after year. With most varieties it is allowable, if the roguing is carefully done, to increase the seed secured from the seed plot by planting it in a certain part of the commercial field and then saving from this part of the field seed for the entire acreage the following season. But if one is not absolutely sure he can pick out the intermediate types in roguing, this practice may prove disappointing. Once the special seed plot is established, it may well be continued from year to year, the seed for the special seed plot each year being selected from the seed plot of the year before. It is even advisable to go into the special seed plot and mark especially promising groups of hills to be dug to furnish seed for the seed plot of the following year.

Lucerne Growing for Seed.—MACPHERSON, A., in *New Zealand Journal of Agriculture*, Vol. 19, pp. 369-371. Wellington, N.Z., 1920.

This article discusses the preparation of the seed bed, general cultural methods, weather conditions, harvesting the seed crop, etc. Conclusions are drawn that good crops of lucerne seed may be produced on well drained soil of average fertility. Very rich land and soil supplied with an abundance of moisture produce herbage rather than seed. Thick stands of lucerne are not favourable for good seed production. During the period devoted to the seed crop, two crops of hay may be taken from thick stands, which will be found of more profit. Old stands that are thinning out will often produce good crops of seed. The best practice for seed production is to establish a special wide-spaced stand by sowing the seed in rows 28 inches or more apart and cultivating two or three times.

Seed Potato Preparation.—HIBBARD, R. P., in *Michigan Agricultural Experiment Station Quarterly Bulletin* 2, pp. 176-178. East Lansing, 1920.

Reports a small experiment on sprouting of seed pieces of various sizes and effect in yield of size of seed pieces. Pieces with but one eye gave 61 per cent sprouting, with 2 or more eyes 100 per cent sprouting. Whole tubers averaging 4.6 ounces gave a yield of 9 per cent more than the yield from seed pieces averaging 1.4 ounces.

Serum Reaction an Aid in the Determination of Agricultural Seeds and Feeds.—BECKER, J., in *Fühling's landw. Zeitung*, Vol. 67, pp. 114-120. Stuttgart, 1918.

An antiserum, produced by inoculating into animals (rabbits) a certain albumen,

possesses the power of causing precipitation of the substance used for inoculation. By means of such a serum reaction it is possible to clearly distinguish between various agricultural seeds and feeds and easily detect adulterations. In preparing the material for inoculation the seeds are ground into a fine powder extracted with a 10 per cent sodium chlorid solution, the extract filtered and the protein precipitated with ammonium sulphate. The precipitate is filtered, washed and dried. Before being used the dried powder is dissolved in a physiological salt solution—5 grams of the powder in 100 c. c. of solution. Of course, it must also be borne in mind that the serum is in many cases specific only when used in the proper dilution.

Culture and Feeding of the Apple Orchard.—

BALLOU, F.H., and LEWIS, I.P., in *Monthly Bulletin, Ohio Agricultural Experiment Station*, Vol. 5, No. 2, pp. 42-48. Wooster, Ohio, 1920.

A comparison of fertilizers with grass mulch and with tillage in apple growing, based on the results of a 5-year experiment recently completed by the Station.

In this experiment which was begun in a practically abandoned Rome Beauty orchard 20 years old, the average cost of the tillage-cover-crop method of culture was \$17.09 per acre per year. This included annual ploughing or disking, cultivation, seed, and seeding. Soy beans were used as the cover crop. The grass mulch method of culture cost only \$2.65 per acre per year. It consisted merely of two clippings of the grass during each growing season, and the necessary trimming, with a scythe, of small areas inaccessible to the mowing machine. The combined cost of the grass-mulch system of culture and of fertilization in connection with nitrate of soda and acid phosphate at the rate of 5 lbs. of each per tree or 200 lbs. per acre per year, even at prices prevailing during the war, was slightly less than the cost of the tillage-cover-crop plan without fertilization.

With the above rate of fertilization, the grass mulch plats gave an average gain of 22.2 bbls. of apples, or a net cash gain of \$71.48, per acre over the unfertilized tillage-cover-crop plats. When both the grass mulch plats and the tillage-cover-crop plats were given 5 lbs. of nitrate of soda and 5 lbs. of acid phosphate per tree, the grass mulch plats still gave a gain of 1.9 bbls. amounting to a cash gain of \$20.52 per acre per year, over similarly fertilized tillage-cover-crop plats.

On the grass mulch plats fertilization with nitrogenous plant food gave a gain of 37.8 bbls., or a net cash gain of \$106.96, per acre per year over no fertilization on similar plats. The results were practically the same where

the fertilizer was applied in circles under the outer extremities of the branches of the trees, or over the entire tree squares of ground. Distributing the fertilizer all over, however, had the added advantage of improving the growth of grass. This amounted to 1,650 lbs. per acre per year, sun-dry weight, as compared with the grass yield of unfertilized plats.

In a separate orchard of somewhat larger trees, wholly cared for by the grass mulch method, several combinations of chemical plant food were compared with no fertilization. The yields of apples per acre per year were for the unfertilized or check plats 36.7 bbls.; for a plat which received 5 lbs. each of nitrate of soda and acid phosphate, applied on a mulch of straw maintained in circular form under the outer extremities of the branches of the trees, 117.4 bbls.; for a plat fertilized with 2.5 lbs. of nitrate of soda and 5 lbs. of acid phosphate annually per tree, 93.4 bbls.; and for a plat fertilized annually with 10 lbs. each of nitrate of soda and acid phosphate per tree distributed evenly over the tree squares of ground, without a mulch, 118.1 bbls., or a gain of 1 bbl. per acre per year for the double quantity or all-over fertilization, as compared with the 5:5 and mulch formula. The costs of the 5:5 and mulch formula and the 10:10 all-over applications were practically the same. The principal benefit from the double application of fertilizer was the greatly increased growth of better grasses.

Plats fertilized with 10 lbs. each of tankage and bone, per tree per year, applied evenly over the tree squares, produced an average of 72.3 bbls. of apples per acre per year.

Fertilization with nitrogenous plant food in the tillage-cover-crop plats gave a gain over no fertilization of 20.3 bbls., or a net cash gain of \$50.96, per acre per year. Unfertilized tillage-cover-crop plats gave an average gain of 15.6 bbls., or a cash gain of \$35.48, per acre per year over the unfertilized grass mulch plats.

LIVE STOCK AND BREEDING

The Present Status of the Diagnosis and Control of Glanders.—REINHARDT, R., in *Berliner Tierärztliche Wochenschrift*, Vol. 35, Nos. 46, pp. 453-456, and 47, pp. 465-468. Berlin, 1919.

This is a survey of the progress since 1912 of the diagnosis and control of glanders. The methods discussed include the mallein test with its different methods of application, and the complement fixation, precipitation, agglutination, conglutination, and lipid fixation blood tests. Of the latter the author recommends the complement fixation test as the most valuable diagnostic method. Progress in clinical and immunization studies is also discussed briefly.

Horses in the Great War: Lessons and Aims.—JANINI, R. J., *Los caballos en la gran guerra, Enseñanzas y orientaciones*, 20 pp., 10 fig., Valencia, Publ. Hijos de Francisco Vives Mora, 1919.

The data on which the author bases his work were chiefly derived from first hand information, verbal or written; the remainder were gathered from publications on this subject. The lessons of the war regarding horse breeding confirm the prediction of competent persons in recent years, namely, that very great importance should be attached to hardiness, strength and fitness, in breeding horses for cavalry and artillery as well as for agricultural and draught purposes.

The English thorough-bred in spite of its great qualities possessed, as a war horse, grave defects of extreme nervousness and great requirements in the way of food and care, defects which had previously been deplored in the Crimean war.

Anglo-Norman trotters, as several authorities, amongst others M. de Gaste, had predicted, were neither suitable for cavalry nor artillery.

The heavy Percheron and the Boulonnais have proved particular over food and little fitted for rough camp life; they lacked frugality, nerve, and hardiness. Breeding has deteriorated these races of large and stoutly built animals by reducing the arab blood in them and has transformed them into expensive and less efficient draught horses. The same is the case with heavy English breeds of horses.

The best riding horses, as numerous French horse breeders, among them the Comte de Comminges, had foreseen, were anglo-arabs of the south of France. The hardy Camargue horses have also rendered excellent service.

As light draught horses, the little Ardennes and especially the little Breton horses, trained in a hardy manner, that is to say as working horses, have given excellent results; all these enduring, hardy, courageous and docile horses have arab blood in them. The horses which have proved the best draught animals have been the small ones measuring 4 ft. 10 inches in height at the withers. Horses 4 ft. 6 inches in height have also been excellent for draught purposes.

Breton cross-breeds and all crosses with much thoroughbred blood have not distinguished themselves either as saddle or as draught horses. The Comte de Robien has complained of Norfolk-Breton horses as wanting in hardiness and docility. The qualities of small horses as draught animals are confirmed by the fact that the British Government has recently purchased in France medium sized Percheron mares to give a new direction to the breeding of draught horses in England.

Information relating to Canadian and Argentine horses are contradictory. According to some people Canadian horses have good qualities, but are extremely nervous. Argentine horses have confirmed their fame for hardiness and American horses have turned out well.

Barbs and mules have rendered excellent services; numerous data proved that Spanish horses and Barbs form a single breed. Modern war has relegated the saddle horse to a secondary position; in France, for example, before the great war, cavalry took 70 per cent of the army horses; at the present time the proportion is 8 per cent, while 92 per cent are draught horses (artillery, staff, engineers, infantry; the latter requiring about 300 horses per regiment).

Can Home Grown Rations Supply Proteins of Adequate Quality and Quantity for High Milk Production?—HART, E. B., and HUMPHREY, G. C., in *Journal of Biological Chemistry*, Vol. 38, No. 3, pp. 515-527. Baltimore, 1919.

The authors report results of a study at the Wisconsin Experiment Station of the nitrogen metabolism of milch cows fed cereal grains without other protein except that derived from clover hay and corn silage. In the first 4-week period the grain ration consisted of ground oats alone, in the second of ground barley, in the third of ground corn, and in the fourth of a mixture of the three grains. The nutritive ratio was approximately 1:8.8, with a protein intake varying from 2.1 to 2.6 lbs. per head daily.

The experiments started with 3 cows. Only one of them, a Guernsey, giving about 22 lbs. of milk a day, maintained her milk flow and remained in nitrogen equilibrium throughout the 16 weeks. The others, a small grade Jersey and a second Guernsey giving respectively about 35 and 32 lbs. of milk at the beginning, showed a marked negative nitrogen balance and declined markedly in milk production until nitrogen equilibrium was reached towards the end of the second period. These cows were then replaced by 2 Holsteins (giving about 30 lbs. of milk) in the hope that with a larger consumption of feed they could utilize protein to maintain the milk flow. Both animals immediately showed pronounced negative balance and shrinkage in volume of milk.

It is thus considered impossible to furnish enough protein from the sources tested to enable a high-producing cow to maintain her yield. The percentage of nitrogen in the milk was not perceptibly changed during periods of negative balance.

Undoubtedly the fact that generally in dairy practice the proteins used are of low production value and that the plane of protein intake often fed to dairy cows is

lower than it should be is partly responsible for the rapid decline in milk production during the progress of lactation. Probably more cows than imagined are in negative nitrogen balance during the early period of lactation and under such conditions rapidly decline in milk flow to offset the losses sustained by autolyzing tissue.

Sweet Clover Seed Screenings Not Injurious to Sheep.—MARSH, C. D., and ROE, G. C., in *United States Department of Agriculture Circular* 87, pp. 7. Washington, D.C., 1920.

Four sheep, weighing from 81 to 99 lbs. were fed for 7 or 8 days on a ration (from 1 to about 2 lbs.) of screenings composed mainly of immature seeds of the white sweet clover. They lost in weight somewhat, but later two of them were maintained satisfactorily during nearly 7 weeks of pasture on a 0.75-lb. ration of screenings, making about the same gain as the other two, which received bran as a supplement to pasture. In another experiment two sheep gained in weight during a month's feeding on alfalfa hay and screenings.

In no case was any injurious result noted and the authors, therefore, are unable to confirm reports that sweet-clover seeds may be poisonous to sheep.

The Value of Mineral and Medicinal Mixtures for Hogs.—GRADY, D. T., and—HOSTETLER, E., in *Bulletin North Carolina Department of Agriculture*, Vol. 41, No. 6, pp. 14. Raleigh, N.C., 1920.

Two hog feeding experiments at the North Carolina Experiment Station are reported. The pigs were all unthrifty and showed the characteristic physical evidences of worm infection. In both tests some were given a proprietary "hog remedy" administered according to the manufacturer's directions, some were fed a mixture of crushed charcoal, slaked lime, common salt, sulphur, and copperas (10:5:4:2:3) and the others received no addition to their grain mixture. The grain mixture consisted of shelled corn, wheat shorts, and peanut meal (2:1:1), with the peanut meal omitted during the initial two weeks of each test. Feeding was entirely in the dry lot.

Three lots of five 52-lb. pigs were used in the first test, which began in December, 1918, and lasted 88 days. Lot 1 (grain alone) made a daily gain of 0.47 lb. per head and consumed 7.3 lb. of feed per pound of gain. Lots 2 and 3 received only the amounts consumed by lot 1, although it was discovered that they had appetite for more. The daily gain per head in lot 2 (charcoal mixture) was 0.63 lb. and in lot 3 (hog remedy), 0.71 lb. The feed requirement for a pound of gain was substantially the same in each, viz., 4.8 lbs.

The second experiment was begun in June, 1919, and continued 142 days. There were 5 lots of five 37-lb. pigs, lots 1 to 3 duplicating the corresponding lots of the first experiment in treatment and uniformity of grain ration. The daily gains per head in these lots were, respectively, 0.33, 0.43, and 0.42 lb., and the feed consumption per pound of gain was 6.6, 5.1, and 5.3 lbs. Lots 4 and 5 received all the grain they would eat. Lot 4 (charcoal mixture) gained 1 lb. per day per head and required 4.6 lbs. of grain for a pound of gain. The rate of gain in lot 5 (hog remedy) was 1.15 lb., and 4.8 lbs. of feed were required for a pound of gain.

Autopsies were made of all hogs at slaughter, and a table gives the numbers of kidney worms, intestinal worms, and liver abscesses found in each animal, and also similar data for check animals slaughtered at the beginning of the tests. The pigs fed the charcoal mixture or the hog remedy were relatively free from worms and abscesses.

Feeding Garbage to Hogs.—ASHBROOK, F. G., and WILSON, A., in *United States Department of Agriculture Farmers' Bulletin* 1133, pp. 26. Washington, D.C., 1920.

Among the points of practical application in feeding garbage to swine, the following are of particular importance in the light of present knowledge on the subject:

The waste-food products of more than 8,000,000 people are being fed to swine and fully 40,000,000 pounds of garbage-fed pork are sold annually. Garbage varies greatly in composition, but on an average and allowing for normal losses, a ton of municipal garbage may be expected to produce 40 pounds of marketable live weight of hog. The garbage must be collected with reasonable frequency and be free from tin cans, soap, broken glass, and other undesirable or injurious foreign articles. The public should be kept informed that garbage is being fed.

Usually it is best for the cities to make the garbage collections and then dispose of the garbage to individuals, associations, or corporations on a contract basis, unless the city operates its own hog-feeding farm. Long-time contracts are likely to be most satisfactory to all concerned; besides they tend toward a better class of equipment and more sanitary conditions.

The pigs to be fed may be bought as feeders or may be raised. Each method has given good results under suitable conditions. Methods of feeding, handling, housing, and care may differ considerably so long as the essentials of sanitation and hog comfort are observed. Equipment for feeding should be adapted to the type of garbage available and to local conditions, climate, and transportation.

Raw garbage is generally better for hogs than cooked garbage. Frozen garbage, however, should be thawed before feeding. As a rule the use of grain as a supplementary feed for the garbage is not an economical practice, but may be used to advantage when the supply of garbage is temporarily short.

Hogs to be fed garbage need to be immunized against cholera, preferably by the double or simultaneous treatment. Thorough immunization is very important because of the presence of raw pork scraps frequently deposited in garbage cans. Garbage-fed hogs show no greater susceptibility to tuberculosis, pneumonia, or kindred diseases than grain-fed animals.

Pork from garbage-fed hogs is as good in quality as pork resulting from other feeds, and average garbage-fed hogs sell at practically the same prices as average grain-fed animals.

AGRICULTURAL INDUSTRIES

Grape Oil from the Canadian Vine (*Vitis Hederacea*).—*Bollettino dell'Associazione italiana Pro piante medicinali, aromatiche ed altre utili*, Year II, No. 4, pp. 56-59, Milan, April, 1919.

The Canadian Vine (*Parthenocissus quinquefolia* Planch = *Vitis hederacea* Ehrh.) a native of North America, is very well known throughout Europe as an ornamental plant. Professors S. Fachini, and G. Dorta, have made a study of the fruits from the point of view of their oil content with the following results:—

Composition of the fruit. Grape stalks 15.6 per cent; grapes, 84.4 per cent.

Chemical compositions of the pulp and skins (of freshly gathered fruits):—Water 3.30 per cent; crude protein 20.11 per cent; fibre 11.26 per cent; ash, 0.18 per cent, nitrogen-free extract 24.15 per cent.

Chemical composition of fresh air-dried seed: water 13.05; crude oil 11.80; fibre 18.00; ash 5.22; phosphoric anhydride in the ash 2.33; protein 12.68; nitrogen-free extract 39.27 per cent.

Oil extracted from the pips.—The oil obtained from the pips carefully separated from the pulp by pressure and extraction by means of solvents, is liquified at a normal temperature and has a green or dark yellow colour with a smell similar to nuts, and a sweet and agreeable taste.

They possess the following characteristics: Sp. gr. at 15° C. = 0.9215; refractive index $n_{15} = 1.4778$; saponification number 189.2-189.6; iodine number 131.4-141.6; fixed fatty acids 93.97 per cent; volatile fatty acids nil; non saponifiable 144 per cent.

Characteristics of the fatty acids: iodine number 144.6; mean molecular weight 281.2; iodine number of liquid fatty acids 148.8-149.9.

The *solid fatty acids* in the oil from the pips do not exceed 3 per cent; they melt at a temperature of 57.6°C. and their average molecular weight = 261.4; they are composed of palmitic acid; no stearic acid was found. The *liquid fatty acids* are composed of oleic and linoleic acids.

Oil extracted from the pulp and skin.—The oil from the pulp and skin obtained by pressure or by means of solvents is olive green with an agreeable odour, and has an astringent taste. At a normal temperature it forms a mass of buttery consistency with a crystalline appearance; it bleaches quickly and turns rancid in the air and light. Its characteristics are:—

Refractive index 1.4722; saponification number, 192.3-193.3; iodine number 90.3; fixed fatty acids, 94%; volatile fatty acids, nil; non saponifiable ditto 1.67 per cent.

Characteristics of fatty acids: iodine number, 94.4-94.6; mean molecular weight 278.8; iodine number of the liquid fatty acids, 110.2.

The solid fatty acid content of pulp and skin oil is about 10 per cent and consists of palmitic acid. The liquid fatty acids are oleic and linoleic

Conclusions.—These researches show that the grape in Canada contains 2 kinds of oil; in the pip, an oil liquid at the normal temperature, belonging to the group of semi-drying oils, containing a large amount of linoleic acid; and in the pulp and skin, an oil of a buttery consistency, that is to say, containing a greater quantity of solid fatty acid and, amongst the liquid fatty acids, a preponderance of oleic acid, but only a small amount of linoleic acid; this fact does not occur often in the composition of other fruit on a single plant.

Prevention of Sprouting and Greening of Potatoes.—SCHNEIDER, G., in *Deutsche Land. Presse*, Vol. 45, No. 51, pp. 315-316. Berlin, 1918.

The results of storage experiments with potatoes, including tests of storing tubers in the dark, in daylight, and under light of different colours such as red, blue, yellow, and green are reported.

The conclusion is drawn that the best lighting of potatoes in storage is subdued daylight, which may be secured by painting the windows with lime or covering them with white or grey paper. These lighting conditions, it is stated, will reduce the tendency to sprout and prevent greening. Yellow, blue, or red light was found as effective as subdued daylight, but dark green light did not give the desired effect. Storage in the absence of light, especially in spring and summer, aided the development of sprouts and is, therefore, not recommended.

Diseases of Apples in Cold Storage.—BROOKS, C., COOLEY, J. S., and FISHER, D. F., in *United States Department of Agriculture Farmers' Bulletin* 1160, pp. 24. Washington, D.C., 1920.

Storage diseases take a heavy annual toll on the harvested crop of apples, greatly reducing an important food supply and increasing the cost and uncertainty of market operations. Delay in warm packing sheds or cars shortens the natural life of apples and greatly increases their tendency to rots and to scald. Filling the storage rooms so rapidly that cold-storage temperatures cannot be maintained has a similar bad effect.

The bulletin deals with a large number of diseases of apples in storage, such as scab, blotch, fruit-spot, bitter-pit, bitter-rot, black-rot, alternaria rot, blue mold, internal breakdown, frost injury, scald, etc.

Ventilation is as important as low temperature in the prevention of scald. Apples scald far less when in baskets, boxes or ventilated barrels than when in the usual tight barrel. Wrapping apples in oiled wrappers furnishes the most complete protection against scald.

PLANT DISEASES

Transmission of the Mosaic Disease of Irish Potatoes.—SCHULTZ, E. S., and FOLSOM, D., in *Journal of Agricultural Research*, Vol. 19, No. 7, pp. 315-317. Washington, D.C., July 1, 1920.

The following is a portion of the author's summary of this paper:—Transmission of potato mosaic by means of tubers, grafting, plant juice, and Aphids (*Myzus persicae*, Sulz.) was effected under various conditions, including those essentially of the field with insects controlled. Infection was obtained with inter-varietal transfer of juice.

Transmission was attempted, but without success so far as could be ascertained in the same season by means of flea-beetles (*Epitrix cucumeris*, Harris), and Colorado potato beetles (*Leptinotarsa decemlineata*, Say). Preliminary observations indicate that infection does not result from growth in soil that produced mosaic potato plants the previous season.

It appears impossible either for infected plants to recover, or, so long as diseased stock is not far off and insect carriers exist, to assure the maintenance of health of susceptible varieties by roguing plots or by selecting hills, tubers, or seed pieces.

Isolation of plants by means of insect cages, as well as elimination of insects in the greenhouse, have maintained stocks disease-free, indicating that control of Aphids and possibly of some other kinds of insects as

well, is the most important means of checking the spread of potato mosaic among susceptible varieties.

INJURIOUS INSECTS

The Clover and Alfalfa Seed Chalcis-Fly.—URBAHNS, T. D., in *United States Department of Agriculture, Bulletin* 812, pp. 20. Washington, D.C., 1920.

This pest, described by Howard in 1880 as *Eurytoma funebris* and for some years supposed to be a parasite of the clover flower midge, has been for many years a pest of clover and alfalfa seed in the Middle and Western States, as described in a popular account previously noted. At the present time it is known to be present in practically every locality in the United States where either red clover or alfalfa seed is grown to any extent, and has been found in seed from Europe, Asia, and South Africa.

The habit of this species of feeding within the growing seeds of alfalfa and red clover is quite different from the general habits common to most of the other members of this group, many of which are parasitic in the larval stage upon various forms of insect life. Its injury consists entirely of the hollowing out of the developing seeds, the injury having been completed by the time the alfalfa seed pods and the clover heads have matured. The loss caused by it is to the growing of alfalfa or clover for a seed crop, it interfering in no way with the growing of either for forage purposes. The plants, seeds of which are attacked, are alfalfa, red clover, bur clover (*Medicago hispida* vars.), *M. falcata*, *M. ruthemica*, *M. tunetana*, *M. tuberculata*, and *M. arabica*. The other common clovers, namely, white, alsike, yellow sweet, white sweet, and sour clover, apparently are not attacked. The loss caused frequently varies from 50 to 400 lbs. of seed per acre as a result of the destructive work of the pest, and there is frequently an additional loss caused by the planting of uncleaned seed and a loss of time and money in replanting.

The practical methods of controlling the chalcis-fly in the alfalfa and clover seed fields are mostly cultural methods. Infestation and control measures are discussed under headings of burning over of fence lines, winter cultivation, irrigation of alfalfa seed fields, cutting early plants on waste areas, careful cutting of hay crops, pasturing before growing seed, allowing the seed crop to stand too long, second crop of seed, and pasturing infested fields.

Brief notes are given on the parasites which attack this species, including *Tetrastichus bruchophagi* Gahan, *Liodontomerus secundus* Gahan, *Eutelus bruchaphagi* Gahan, *L. perplexus* Gahan, *Habrocytus mediscaginis* Gahan, *T. venustus* Gahan, *Trimeromicrus*

maculatus Gahan, *L. insuetus* Gahan, and *Eupelmus* sp. The larvæ of a midge of the genus *Lestodiplosis* have been found in infested alfalfa seeds, where they had apparently destroyed the larva of *B. funebris*.

Combined Bordeaux Oil Emulsion Spray.—

15th Bienn. Report, Oregon State Board of Horticulture, p. 82. Salem, Oregon, 1919.

A spray has been designed that, applied as the buds are opening will control scab, San Jose scale, *Aspidiotus perniciosus*, Aphids, leaf-roller, red spider, *Tetranychus* and curl leaf of the peach, and if it dries thoroughly it will stay on the bark all through the season.

To make it a 200 U.S. gal. tank is filled three-quarters full of water, and 24 U.S. gals. of copper sulphate solution (1 lb. to 1 U.S. gal. of water) are added. Milk of lime, made with 12 lb. slaked lime, is then poured in until litmus paper shows that the solution is neutral, and $1\frac{1}{2}$ gals. of glue solution ($1\frac{1}{2}$ lb. glue in water) are then added; twelve U.S. gals. of the General Chemical Company's No. 1 oil emulsion, or a corresponding one, are stirred with a little water until emulsion is started, and poured into the tank with enough water to make the whole up to 200 U.S. gals.

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AGRICULTURAL STATISTICS

THE WHEAT CROP OF 1920

The following table gives the official estimates of the wheat production of 1920, for the countries which have reported to the Institute, compared with that of 1919 and the average of the five years 1914-1918.

Countries	1920	1919	Average 1914-18
	Bushels	Bushels	Bushels
Belgium.....	8,799,000	9,895,000	7,935,000
Bulgaria.....	41,190,000	34,029,000	29,308,000
Spain.....	134,457,000	129,251,000	137,221,000
Finland.....	272,000	306,000	229,000
France.....	230,406,000	182,446,000	214,139,000
England and Wales.....	54,381,000	63,808,000	64,483,000
Greece.....	13,288,000	9,693,000	
Italy.....	141,096,000	169,771,000	167,991,000
Netherlands.....	6,677,000	6,015,000	5,321,000
Sweden.....	11,123,000	9,509,000	8,707,000
Switzerland.....	3,586,000	3,524,000	4,205,000
Jugo Slavia.....	64,709,000	50,956,000	
Canada.....	293,361,000	193,260,000	248,085,000
United States.....	750,648,000	940,987,000	822,246,000
Guatemala.....	312,000	251,000	632,000
India.....	376,768,000	280,299,000	352,986,000
Japan.....	29,468,000	30,676,000	27,802,000
Morocco.....	14,757,000		15,618,000
Algeria.....	12,432,000	19,166,000	33,191,000
Tunis.....	3,987,000	5,841,000	5,897,000
Egypt.....	27,246,000	30,137,000	34,186,000
Totals less Greece, Jugo-Slavia and Morocco.....	2,126,209,000	2,109,171,000	2,164,564,000

UNITED STATES NOVEMBER CROP REPORT

	1920 preliminary	1919 December estimate	1914-1918 5-year average
Corn..... bushels	3,199,126,000	2,917,450,000	2,760,480,000
Wheat..... "	750,648,000	940,987,000	822,246,000
Oats..... "	1,444,411,000	1,248,310,000	1,414,558,000
Barley..... "	191,386,000	165,719,000	214,819,000
Rye..... "	77,893,000	88,478,000	59,933,000
Potatoes..... "	421,252,000	357,901,000	382,113,000
Flaxseed..... "	10,736,000	8,919,000	12,922,000
Tobacco..... pounds	1,476,444,000	1,389,458,000	1,187,708,000
Hay..... tons	106,451,000	108,666,000	99,304,000
Cotton..... bales	12,123,000	11,329,755	12,424,000
Clover seed..... bushels	1,593,000	1,099,000	
Sugar beets..... tons	8,812,000	6,421,000	6,051,000

CROP CONDITIONS IN THE SOUTHERN HEMISPHERE

Argentina.—At the end of October prospects for the new crops were excellent. Moderate rains had fallen throughout the country.

Australia.—Good rains continued to fall and early in November the expected

bumper yield of wheat was practically assured.

South Africa.—At the end of October crop prospects were quite favourable. The wheat yield was estimated at 8,640,000 bushels against 6,630,000 last year.

THE SOWING OF THE NEW WINTER CEREAL CROPS

United Kingdom.—The weather of October was very favourable for cultivation and sowing, but owing to the late harvest this work is backward in many parts of the country, especially in Wales and the north. In the east and south very good progress was made. Where up, the crops have germinated regularly.

France.—On the first of November the sowing of the new winter crops was progressing favourably, having been favoured with good weather.

Sweden.—The weather was favourable for the cultivation of the land for winter crops.

Germany.—The weather has been fine. On November 1st wheat sowing was considerably behindhand, but the greater part of the winter rye and barley crops were already in the ground.

Roumania.—Reports in October spoke favourably of winter seeding.

AGGREGATE SUPPLIES OF WHEAT AND RYE AVAILABLE FOR IMPORTING COUNTRIES

A recent publication by the International Institute of Agriculture furnishes data of very great interest as to the quantities of wheat and rye which importing countries may obtain during the season from August 1, 1920, to July 31, 1921.

On the basis of data now available, and of forecasts of an average yield from the growing crops in Argentina and Australia, the Statistical Bureau of the Institute estimates that Bulgaria, Jugo Slavia, Canada, the United States, British India, Argentina and Australia should be able to export during the season 643,000,000 bushels of wheat and 32,000,000 bushels of rye, making a total of 675,000,000 bushels of breadstuffs. Taking into account the fact that the quantity afloat on August 1, 1920, was very large, the aggregate quantities at disposal of importing countries are estimated at 683,000,000 bushels of wheat and 35,000,000 bushels of rye; the complete total is therefore 718,000,000 bushels, against a quantity amounting to 680,000,000 bushels of wheat

and rye, forming the actual receipts of importing countries during last season.

On the other hand, the total production of the two cereals in the importing countries comes out very nearly the same as it was last year (1,220,000,000 bushels against 1,230,000,000 bushels.)

It follows that overseas requirements should not be much greater than last year's, while *potentially*, about 35,000,000 bushels more than they imported last season will be at disposal of the importing countries.

But there is no positive assurance that the potential exportable surplus will in its entirety reach the countries that may need it, inasmuch as it is not certain that India will export all its apparent surplus, while, within the period still separating us from the coming harvests of Argentina and Australia, our present expectations regarding those crops may be modified, unfavourably. Prudence dictates abstention from undue optimism in view of these uncertain factors of the situation.

THE AGRICULTURAL GAZETTE OF CANADA

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